ETC

A REVIEW OF GENERAL SEMANTICS

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Physico-mathematical methods in the study of man: ANATOL RAPOPORT outlines the aims and tasks of Mathematical Biology.

JOHN CAFFREY comments on critics, poets, and audiences. What are the proper relations among these from a semantic point of view?

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THE AIMS AND TASKS OF GENERAL SEMANTICS:
Implications of the Time-Binding Theory[1]

S. I. HAYAKAWA

THE AIMS and tasks of general semantics, however numerous they may seem to be to the many students of the subject who are busy applying its formulations to the sciences, to humanistic studies, and to practical affairs in business or education, may all be regarded as parts of one large, all-embracing task, namely, that of advancing human time-binding. It is the task of students of general semantics first to bring to wider scientific and public awareness the fact of time-binding as the central mechanism of human survival. Secondly, it is their task to encourage and strengthen those cultural institutions and forms (economic, political, and social) under which time-binding best flourishes, and to oppose those cultural conditions which would discourage or limit time-binding. Third, it is the task of students of general semantics to nurture in individuals, through education and through the support of parallel tendencies in the educational efforts of others, those conditions of emotional maturity such as will insure the fullest possible realization of the time-binding potential that resides in every human being.

The foregoing paragraph would be entirely clear, I am sure, if only the term 'time-binding' were explained. Time binding is the term used by the late Alfred Korzybski to describe the fact that the unique survival mechanism of human beings is not, as among oysters, a hard shell and extreme fecundity; not, as among wolves, ferocity and sharp teeth; not, as among giraffes, long necks and fleetness of feet; but the ability to organize social cooperation *at a distance* and to accumulate knowledge *over generations of time* through the use of symbols. When human beings communicate with each other with drums beaten in the jungle or with radio-waves carried half way around the world, they are behaving in ways specific to their species. Similarly, when human beings make use of science, geography, technologies, ethical systems, laws, or literature, they are using the accumulated product of the insights, intuitions, and observations of thousands of fellow-members of their species, most of them long dead. The ability of human beings to accumulate and add to their

[1] Presented as a University of Chicago Public Lecture, sponsored by the Committee on Mathematical Biology, July 19, 1950.

information and knowledge and techniques from generation to generation, so that each generation starts where the last generation left off, Korzybski calls the time-binding capacity. Human beings are, then, the 'time-binding class of life.' All the fruits of scholarship, of science, of poetic or ethical vision, of handicrafts and skills and technologies, which we have received from the past are products of 'time-binding.' All that we have in the present which we find worth saving and passing on to our children and our children's children we pass on because we are 'time-binders.'

Time-Binding vs. Culture-Bearing

THE DEFINITION of man as time-binder is not dissimilar to the anthropologist's definition of man as culture-bearer. Both definitions place emphasis on the fact that men are social products, each man being a member of a society which includes not only his living contemporaries but the dead — the long line of cultural ancestors whose contributions make a culture what it is. The anthropologist, however, tends to refrain from passing judgment on the superiority or inferiority of the customs and institutions of one culture over those of another. The student of general semantics respects the anthropologist's desire for descriptive accuracy that prompts this suspension of value-judgments, but he cannot go all the way with the anthropologist in this suspension.

The definition of man as time-binder, like the definition of man as culture-bearer, implies that man has got as far as he has as the result of the pooling of knowledge, as the result of the exchange and transmission over generations of information, technologies, and accumulated wisdom. It differs from the definition of man as culture-bearer in that it implies that constant and *continuing* exchange of knowledge, so that the sum of available knowledge *increases* in predictive value from generation to generation, is not only desirable, but mandatory to survival. The time-binding formulation implies, in other words, that when man is functioning to his full potentialities, the artistic or technical or medical or philosophical resources of a culture will progressively become richer as time goes on. Time, says Korzybski, is the human dimension, so that static cultures, in which generations may pass without change, are doomed cultures.

Nevertheless, all cultures, throughout historic time, have placed limits on time-binding. There have been, and still are, topics forbidden to investigation in all known cultures. There have been, and still are, limits placed on the exchange of information in all known cultures: the restriction of communication between classes and castes, and the forced exclusion of ideas imported from other tribes or other nations. Practically all cultures believe that on certain topics all that can be known or is necessary to be known has already been accumulated; consequently those who might wish to question or add to knowledge on those topics are persecuted. These and many other limitations

placed upon the time-binding process are, to be sure, themselves products of culture. *But they run directly counter to the process by which culture is created.*

Hence, as I have said, the general semanticist cannot go all the way with the anthropologist in refusing to evaluate the relative merits of cultures. He must prefer those cultures which place few limitations on time-binding over those which place many. He must prefer those actions and measures which increase the total amount of time-binding over those which may arrest or decrease time-binding. *For the definition of man as time-binder is essentially a definition of man as a co-operative class of life; the more men co-operate, the more do they manifest and realize their humanness.* The preference that the general semanticist shows for cultures that permit more rather than less time-binding is therefore a preference for the more human rather than the less human cultures.

Political Implications

CONSEQUENTLY, the student of general semantics, as a citizen, will tend to support ideals of international and cultural co-operation such as are held by people of good will, of many different faiths and nationalities, all over the world. He will tend to support such ideals as those of the United Nations, which hopes to transcend the limited time-binding of separate and sovereign nations with fuller time-binding on an international scale: the pooling of the material, technical, and intellectual resources of all the nations of the world for the purpose of solving problems wherever they may arise. He will tend to oppose political thought-control wherever it may arise, for thought-control is the antithesis of time-binding. He will oppose racial and religious discrimination, not solely out of democratic sentiment, but also out of a conviction that fullest time-binding necessitates the freest cultural interchange between all races and creeds and classes. He will support freedom of speech, press, and assembly not solely because he is culturally conditioned to value these freedoms (although this no doubt will be a large part of his reason), but also because he holds that restrictions of these freedoms are denials of the cultural process.

The difference between the point of view of general semanticists and that of some cultural anthropologists is illustrated in a conversation I recently had, in which an anthropologist said in reply to an unfavorable comment I had made regarding a dogmatic and closed cultural system, 'You were brought up in an open-ended system, so you like open-ended systems. But open and closed systems are simply alternative ways of organizing human thought and behavior. One is just as valid as the other.' To this, the reply of the general semanticist must be that he cannot be indifferent about closed systems because such systems imply that on certain important topics all the time-binding necessary has already been done and further time-binding is unnecessary. Indeed,

it is hard to see how even the most dispassionate anthropologist can remain thoroughly neutral with respect to open and closed systems. When beliefs are frozen into immutable dogmas — and it is usually beliefs about human nature and conduct that are so frozen — such a condition is not only inimical to science, it is especially inimical to the science of cultural anthropology itself. As Anatol Rapoport says in his *Science and the Goals of Man,* a scientist 'cannot be impartial in his judgments about forms of social organization or about patterns of culture, if it is clear that one form tends to encourage scientific behavior and another to inhibit it.' In short, the general semanticist is not satisfied with just any old culture. The definition of man as a time-binding or co-operative class of life gives him a theoretical ground upon which all cultures, including our own, may be criticized and evaluated.

Co-operative Map-Making

ANOTHER WAY of looking at general semantics is to say that it is a methodological discipline to enable individuals and groups to apply scientific ways of thinking to everyday life, to problems of social interaction, to problems of decision in practical affairs, as well as to problems of a scholarly and theoretical nature in those areas where scientific attitudes are not yet general. As George Taylor once put it, general semantics is a science of the ways of science. Let me try to explain what this means.

Let us, using Korzybski's metaphor, speak of the world of subverbal reality as the territory, and of our words and ideas about reality as maps of the territory. All problem solving requires some kind of more or less accurate map-making. If we wish to bake a cake, we have to know something about the characteristics of the flour we intend to use; if we wish to build a bridge, we have to know something about the properties of steel and concrete, the strength of the current and the width of the river to be bridged, and so on; if we wish to rule a nation, we have to know something about the people in it, their habits and desires, their state of economic well-being, the resources available for meeting their needs. Whether we successfully bake the cake, build the bridge, or rule the nation depends on how well we have mapped the territory we are dealing with.

Science may be regarded as the systematization of two things: first, it is the systematization of certain habits common to at least a part of the problem-solving behavior of all people in all cultures, namely, observing, checking, making hypotheses, and testing them; secondly, it is the systematization of the means whereby the making and checking of observations and hypotheses may be done *co-operatively* through comparing observations, repeating experiments, pooling information, and, prior to all this, establishing linguistic conventions, systems of nomenclature, systems of weights and measures, methods

of recording, so that any number of observers may exchange reports with each other and thereby refine them both for increased accuracy and increased generality. In short, science is a huge co-operative enterprise of human beings *jointly* trying to make better and better maps of reality. It is so co-operative that in principle anyone may help himself freely to the information so collected. (I say in principle rather than in fact, because when scientific discoveries are made for the specific purpose of advantaging oneself at the expense of others, as in business competition or in war, advantageous findings are concealed from competitors or enemies.) In those fields of science in which commercial or military advantage is not apparent, no concealment takes place; scientists take pleasure in exchanging information and journals with each other all over the world. Many scientific journals make an explicit point of *not* copyrighting their material. Science is so co-operative, too, that anyone may contribute to the pool of scientific knowledge. No matter how venerated or hoary a scientific principle, there is nothing inherent in science to prevent its being overthrown by a part-time laboratory assistant if he can produce observable and verifiable data or calculations to the contrary.

Science, then, is the outstanding example — perhaps the only thoroughgoing example — of the *institutionalizing* of time-binding habits and the institutionalizing of the *avoidance* of cultural or private habits of evaluation that hinder or limit time-binding. The culture-pattern of the scientific world is therefore not just another culture pattern to be evaluated as no better and no worse than the kinship system of Australian aborigines, the potlatch of the Kwakiutl Indians, or the gambling practices in connection with the races at Arlington Park. *The culture-pattern of the scientific world is rather the systematic selection from prevailing cultural-patterns of those specific ways of abstracting and those specific forms of linguistic behavior that ensure the maximum rate of increase in knowledge through ensuring the maximum of human agreement.*

Science as Technique of Agreement

SCIENCE then is a technique of agreement, perhaps the greatest we have, and certainly the only one which has been strongly enough institutionalized among enough people in enough different cultures and to have produced enough time-binding results to have acquired an almost universal prestige. Sometimes it is said by people hostile to science that 'science isn't everything,' that 'science is arrogant,' that 'science has become a sacred cow.' Such comments appear to me to show an almost wilful blindness to what is central to science, which is, above all things, a technique of agreement that systematically seeks to reach across cultural divisions of race, language, religion, and social status, in order to extend the possibilities of human co-operation.

It is the position of general semanticists that the orientation of science, central to which is the determination to find grounds for agreement so that

investigators may go on *together* from there, need not, indeed, cannot be confined to scientists. Scientists themselves, to be sure, often fail to exhibit such an orientation outside the laboratory, nor are they uniformly successful in exhibiting it even within the laboratory. Nevertheless, the main features of this orientation are easily described. I have already mentioned, in addition to the desire for agreement, another feature of the scientific orientation, namely, its essential democracy, which resides in the fact that all may contribute to science what they can and take from it what they need. A related feature of science is the fact that all scientific statements are always open to challenge.

A scientific statement, capable of being verified by anybody making the same observation and using the same linguistic conventions to report them, is often said to be 'objective,' while private judgments and observations are said to be 'subjective.' This dichotomy between 'objective' and 'subjective' has long appeared to me a philosophical tragedy, needlessly dividing philosophers, both professional and amateur, into warring camps, and effectively obscuring for generations the important characteristics of scientific statements. What is called a 'subjective' or 'unscientific' statement is one that is supported by the evaluations of only one individual or a few, or the members of only one loyalty group. What is called an 'objective fact,' long regarded as a fact which 'exists independently of the mind,' is better regarded as one upon which *any number of independent observers,* Frenchmen and Germans, Arabs and Jews, Christians and Buddhists, Elks and Jehovah's Witnesses, *can agree.* The important point again is agreement.

Another characteristic of the scientific orientation is what is called open-mindedness, or the willingness to listen. In science, there is, as Wendell Johnson once said, never the last word, but the latest. This again is a recognition of the continuous character of time-binding; it cannot be stopped for the very simple reason that conditions change, the earth changes, the universe changes, and human needs change, so that even the most 'established' of scientific truths inevitably need, sooner or later, modification or revision. But there is a deeper, psychological reason in human relations for scientific open-mindedness. It is that a scientist, insofar as he wishes to behave scientifically, must retain always the ability to listen, and so ensure the continuance of communications among human beings, the result of which ultimately is agreement. Nothing cuts off communication so completely as the knowledge that you are not being listened to. A political or religious leader can lose his ability to listen, and may retain unaltered his status as political or religious leader. But a scientist who has ceased to listen loses his status as scientist.

I have said that the basic aim of general semantics is to advance time-binding. Another way of stating this is, then, to say that the aim of general semantics is to make more widespread the orientation of the scientist. This is not to say that everybody should study physics, chemistry, and mathematics.

It is entirely possible for people to spend a lifetime in the physical sciences without ever acquiring a scientific orientation about the generality of non-technical problems. No, the scientific orientation may be acquired with or without training in mathematics and the physical sciences, for that matter, with or without formal schooling at all. I am not, therefore, arguing for the special methods of one science or another. The emphasis is on the *orientation* institutionalized in science, which can be and is exhibited by many people other than scientists. This orientation might have been called the 'political orientation' or the 'philosophical orientation' if it had been first institutionalized in politics or in philosophy. Calling it the scientific orientation is simply recognition of the historical fact that science is so far the only human activity in which this orientation has been institutionalized.

IN ORDER to make clear what I mean by the scientific orientation, let me contrast it with some of the prescientific and antiscientific orientations. If people do not have the attitudes of an earnest desire for agreement, if they are not content with small agreements as a basis for building larger agreements later, if they are not willing to listen, if they do not have a respect for facts arrived at by any number of independent observers and the ability to modify or correct generalizations in the light of new information, what alternative attitudes are they likely to have?

First, there is the orientation of dependency, in which statements are accepted not because they are verifiable, not even because they are logically consistent, but because they originate from a parent or parent-surrogate, which may take the form of a person, a professor, an employer, a political leader, a philosophical system, a sacred book, or even a Hundred Sacred Books. The general motto of this orientation may be stated, 'Daddy says so.' Under this orientation widespread human agreement would be possible if, and only if, everybody in the world accepted the same parent-figure as authority. Throughout recorded history, people have realized that universal human agreement is desirable; they have therefore tried to achieve it by this means. They have sought to conquer the world for Alexander, for Ghengis Khan, for Napoleon, and for Hitler, in order that, when the conquest was over, universal peace would descend on the earth through the acceptance of a common world leadership. People imbued with missionary spirit have also operated on the same assumptions about agreement. Obviously if we all accepted Jesus, or Buddha, or Mahomet, or Father Divine, to name only a few religious leaders whose followers have had the missionary spirit, we should have a basis for universal agreement. Unfortunately, people throughout history have never been able to get together in the acceptance of a common father-figure. Human history is so gloomy in this matter as to leave us little hope that widespread human agreement can be achieved by this orientation.

Another prescientific or antiscientific orientation is word-mindedness as distinguished from fact-mindedness, or, in the language of general semantics, intensional as distinguished from extensional orientation. Among the unstated assumptions underlying this orientation are the following: 'If a statement sounds true, it must be true'; 'If it is eloquently stated, it must be true'; 'If the speaker has a beautiful voice, it must be true'; and finally, the most vicious form of all, 'If a statement logically follows from certain assumptions regarded as "self-evident," it must be true.' Words are extraordinarily intoxicating things. A flood of oratory is capable of producing a mild jag in most people; some orators, including in our own times Hitler and Huey Long and Father Coughlin, have been able to produce a good deal more than a mild jag.

In addition to the obvious verbal intoxications produced by demagogic spellbinders, there is the more dignified kind of spellbinding among intellectuals produced by what may be called the scholastic tradition. The Greeks, an inexhaustibly loquacious people, seem to have started it. It was their assumption that if people argued and talked long enough, the truth would ultimately emerge. Thus began the long tradition of forensics, rhetoric, persuasion, and other verbal gymnastics — a tradition that lives to this day in the majority of rural high school debating clubs as well as in America's Town Meeting of the Air. Putting propositions to operational tests is something that did not occur to the Greeks; they were not accustomed to using their hands since they had slaves to do all their work for them. Consequently, the inheritors of this garrulous tradition do not, to this day, put propositions to operational tests — and we are all, in Western civilization, inheritors of this tradition. Therefore we all have within us, on some subjects, an excessive susceptibility to resounding and erudite phrases whose meaninglessness is obscured by their respectability in learned discourse.

Whether our excessive susceptibility to words unrooted in facts takes the form of a primitive faith in incantation or the more sophisticated form of scholastic verbigeration, the importance of this susceptibility lies in the fact that it is another barrier to human agreement. If we insist on problem-solving through word-magic, or if we insist on believing any statement that sounds good, or if we clutter up our discourse with terms that cannot be found to have extensional meaning, obviously we are going to have difficulty in getting people to agree with us.

Mysticism and Wishful Thinking

STILL another orientation is the mystical orientation. This is sometimes an extreme manifestation of the intensional orientation, but sometimes it is not. The mystic is a person who talks to himself and to others of a like mind in a language comprehensible only to himself, but which seems to give him great inner comfort and inner conviction. This language is usually extremely

high-falutin', and often meaningless — and if it is actually meaningless, it is simply an exaggerated instance of verbal auto-intoxication. Sometimes, however, the language of the mystic appears to stand for something quite real in his experience, some kind of events or perceptions for which common language has no name, no vocabulary. The mystic, in this case, seems to be trying to say in language something for which no language exists. Therefore he does what we all do when confronted by this problem: he sprays an enormous number of words in what he hopes is the right general direction, hoping that some of them will hit the target. And the hearer is always left with the question, is he just spraying words around, or is there actually a target? If there is an actual target, then what the mystic says today may be the science of tomorrow, when people with the orientation of science have united to produce an agreed-upon vocabulary in which these events and experiences may be reported. But the fault of mystical language, whether or not it may ultimately stand for something, lies in the fact that it is incapable of producing human agreement; the criticism to be made of most mystics is that they usually show no disposition towards revising their language in ways that might enhance the possibilities of agreement.

Another orientation alternative to the scientific is what might be called the orientation of wishful thinking. According to this point of view, whatever we want passionately enough to be so, is so — and if you doubt that it is so, you are a crude materialist, you have no soul, you are a miserable cynic, etc. This orientation is one greatly encouraged by most of the major forces of public opinion. The best example I remember is a Shirley Temple movie I got dragged to many years ago, when she was still a child star. In it she is the technicolor daughter of a technicolor British officer who goes away to fight in the Boer War. It is reported that her Daddy has been killed. She refuses to believe this, and for what seemed to me like tens of thousands of feet of film, a great point is made of her refusal to believe in her father's death in spite of accumulating evidence to the contrary. Of course, in visiting a military hospital (I don't remember how she happened to be visiting one, and somehow or other Queen Victoria got into the story at this point) she eventually finds her Daddy, much wounded, and a victim of amnesia, and her simple, child-like love restores his memory and, presumably, his health. Moral: believe what you passionately want to believe, no matter what evidence is adduced to the contrary, and your faith will be rewarded, like the faith of this little child. There are many criticisms to be made of this orientation which, after all, is just as common among philosophers and statesmen and voters as it is among Shirley Temple fans, but for our restricted purposes now, I need only point out that it does not help to make human agreement possible.

The last orientation alternative to the scientific that I wish to discuss is what might be called the 'yes-but' orientation. This is the orientation of

people who are willing to make verifiable statements, to seek languages in which agreement is possible, and in every way to behave like earnest time-binders *except* when they arrive at subjects involving their special moral, philosophical, cultural, or class prejudices, at which point they dig their heels into the ground like balky mules and cry, 'Yes, but . . . .' This orientation is extremely common — I suspect we all have it to some degree — and no doubt it has been encouraged by the many crude misapplications of what looks like scientific method to areas where those particular scientific methods are not appropriate. The most dignified manifestation of this orientation is to be found in that philosophical position known as dualism, of which the classic motto is Ralph Waldo Emerson's, 'There be two laws discrete, a law for man, a law for thing.' Everything in the universe, except man, is discussable, according to this view, by science, which is the 'law for thing.' The 'law for man,' however, is something else, to be discussed by other methods. Now, this may well be true; there are indeed shortcomings to the scientific method when we discuss human problems, especially our own. I shall not presume to say what Emerson meant by his statement, but those who make a motto of it use it to justify throwing out the scientific *orientation* as well as the method in discussions of human problems. Unfortunately the other kinds of orientation: the Daddy-says-so orientation, the intensional orientation or orientation towards verbal auto-intoxication, the mystical orientation, and the orientation of wishful thinking, seem to be about the only existing alternatives. Hence philosophical dualists and other yes-butters are destined, at whatever point they say yes-but, to have some area in their thinking in which their orientations preclude the possibility of widespread agreement.

WHAT WE CALL in general semantics a scientific orientation is not, therefore, test tubes, or logarithmic tables, or betatrons, or other paraphernalia of science; it is not even an attitude of cold, calculating detachment, as is popularly believed. (The notion that science and reason are of necessity 'cold,' is a superstition engendered by the fact that, since the more spectacular forms of unscientific behavior are obviously hot and impetuous, it is assumed that its opposite must be cold and detached. But extremely unscientific behavior can also be cold and detached — indeed, it can become routine — as anyone can testify who has seen at work the slow bureaucracy of railroad ticket offices.) The essentials of scientific orientation are simply (1) the determination to find bases of agreement and the concomitant degree of intellectual and emotional flexibility, (2) the willingness to put statements to operational test, and (3) the internalization of the knowledge that there is always something more to be learned about everything, so that one always remains capable of listening. In short, the orientations of science are simply the orientations of sanity; this is the meaning of the title of Korzybski's book, *Science and Sanity*. Sanity, so defined, is necessary to every field of human activity.

Toward a Science of Man

KORZYBSKI'S theory is ultimately biological; as he said, what is needed is a science of man as a branch of the biological sciences. Such a science would, of course, necessitate the uniting of psychology with neurology, and much of Korzybski's work was devoted to the investigation of evaluative behavior on the molecular level. The mathematical biologist, insofar as he is able to demonstrate the physiological foundations of 'psychological' behavior, as he does in such matters as the theory of neural nets, both supports and advances the theories of general semantics. Korzybski's great thesis is that time-binding is 'normal' behavior for human beings, just as building dams is 'normal' for beavers, both being instances of the employment of the survival mechanism peculiar to the species. (The word 'normal' is used here in an engineering sense, in which a six-cylinder engine is said to be running 'normally' only when it is hitting on all six cylinders, even if, at a given moment, a large number or even a majority of six-cylinder engines in the world are hitting on five cylinders or less.) Korzybski's thesis also states, therefore, that anti-time-binding behavior and attitudes are evidences of ill-health or un-sanity; just as the refusal or unwillingness of beavers to build dams when materials are available would be evidence of something seriously wrong with beavers. A culture which has institutionalized anti-time-binding behaviors is, from this point of view, a culture led astray and sick.

I have said that the one great task of general semantics is to advance time-binding. If enough people in enough places, are enabled, through the study of general semantics or anything else, to acquire the orientations of science with respect to their most pressing problems, artistic, political, and ethical as well as scientific and technical, then a time may be envisioned when groups, classes, and even nations might begin to listen to each other with the specific intent of finding even small areas of agreement upon which larger agreements may eventually be built. If such a time ever arrives, it will not come simply because we desire it. It will come because enough people have disciplined themselves in the *avoidance of those orientations which inevitably lead to failures in communication and therefore to disagreement.* It is interesting to note that the training of counselors in nondirective therapy can be described in general semantics terms as consisting in large part of training in the avoidance of just such orientations. In group dynamics, which can be described as small-scale time-binding, the training of group leaders is training of the same kind. No doubt there are other disciplines which have likewise found ways of making operative in everyday life the orientations of science. It is finally the task of general semantics, therefore, not only to promote time-binding in its own way, but to promote it by systematizing and disseminating knowledge of those rising psychological, biological, and social disciplines which are each, in their own way, increasing the total amount of time-binding in the world.

THE AIMS AND TASKS OF MATHEMATICAL BIOLOGY*

ANATOL RAPOPORT

THE NAME of mathematical biology indicates both its subject matter and its method.

The subject matter of biology is sufficiently well known. Biology studies living objects and events associated with life. Zoology and botany, histology and physiology, genetics, embryology and ecology are all concerned with various aspects of the life process and therefore are branches of biology.

The meaning of the word 'mathematical,' particularly as applied to biology, is less widely understood. 'Mathematical' refers to the particular method which people who call themselves mathematical biologists have chosen in order to advance our knowledge of the life process. The method is distinguished from other methods in that it is *quantitative* and *theoretical*. These are two separate characteristics. There are methods which are quantitative but not theoretical and others which are theoretical but not quantitative. But mathematical biology is both theoretical and quantitative.

The meanings of these terms can be more fully explained if we stop for a moment to examine the various methods of scientific procedure. How do we get knowledge about the world and how do we systematize it?

Description, Theory, Experiment

TO BEGIN WITH we can make direct observations of things and events and then describe and classify what we observe. Let us call this the *descriptive* method. For instance, the early methods of geographic exploration and description are examples of the descriptive method. The explorer noted the locations of rivers, mountain ranges, forests, etc., and described them as accurately as he could. The result was descriptive geography.

Of course, the descriptive method is applicable also to other disciplines. In the XVIII century, zoology was very largely descriptive. Zoologists went out into the fields and forests and caught all kinds of animals, birds, and insects. They studied their body structure in great detail and described them. As they

* Presented as a University of Chicago Public Lecture, sponsored by the Committee on Mathematical Biology, July 20, 1950. The figures are reprinted from N. Rashevsky's *Mathematical Biophysics*, 2nd edition (University of Chicago Press, 1948). References to theoretical and experimental work described here can be found in that volume.

described them, it became apparent that there were some striking similarities among different animals, but also the disparities were extremely wide. In this way methods of classification suggested themselves. The animal kingdom was subdivided into phyla, phyla into classes, classes into orders, families, genera, and species.

A second kind of scientific procedure can be called the *theoretical* method (or the deductive method). The central task of this method is the construction of a theory, that is, postulating some general principles from which observed facts can be deduced. An excellent example of such a procedure is the formulation by Newton of the three laws of motion and of the law of gravity, from which the observed behavior of the planets and the motions of inanimate objects around us could be *deduced*. It is true that a great deal of observation and description may, and usually does, precede the generalizations upon which a theory is constructed. But the formulation of a theory goes a great deal farther than observation and description. Often the principles postulated in the theory cannot be directly 'verified' at all: only the deduced conclusions can be verified by observation.

An example of a biological theory is the theory of evolution. It is postulated as a certain principle of this theory that successive generations of animals differ more and more from their ancestry. On the basis of this theory, our knowledge of zoology could be organized in a certain way. Now the way our knowledge is organized has the greatest bearing on the way our knowledge will grow and develop. Thus the development of theoretical methods is of utmost importance to science.

A third kind of scientific procedure is the *experimental* method. Here situations are deliberately designed where certain events can be studied in isolation from others. The main development of chemistry in the eighteenth and nineteenth centuries, for example, was a result of the development of experimental techniques. Substances were mixed in various proportions and under various deliberately created temperatures and pressures, and the results noted.

There are numerous examples of experimental biology. Physiology, for instance, is largely experimental. Organisms are subjected to various conditions and their behavior under these conditions is described.

Of these three methods of science, the experimental method is the most widely publicized, occupies the greatest number of scientific workers, gets the largest allotment of funds, and in the popular mind is often identified with all of science. The scientist of the comic strip and in the movies is almost invariably portrayed either in a white coat looking at test tubes or tampering with some impressive apparatus.

In order to do justice to our discussion of mathematical biology, we must, before we go any farther, dispel this popular identification of all science with experimentation. Neither the experimental method, nor the theoretical, nor the

descriptive is alone sufficient in any modern scientific discipline. The three must be combined.

It is obvious that no amount of theorizing, no matter how self-consistent and learned, will establish a single truth. Experiment is the final court of appeal for the scientist. Therefore observational and experimental technique must develop alongside the development of theory.

What is not quite obvious is that observation and experimentation are worthless without theory. This is often overlooked because theories may be lodged in the minds of men without their being aware of their presence. Unconscious theories are tacit assumptions, and it is in this form that they sometimes do more harm than good.

Take the 'purest' kind of descriptive science, say XVIII century zoology, which confined itself to examining and describing existing types of animals. It would seem at first that this procedure is independent of theory. But let us look closer. Descriptions were made of *kinds* of animals, say species. But it is not true that every animal of a species was caught, studied and described. Only a few specimens were actually studied. Where is then the justification that there exists such a thing as a *species,* that is, sufficient similarity among millions of individuals to warrant the application of the same name to all of them? The justification comes from a tacit assumption, namely, that 'like begets like.' It was assumed in the XVIII century that the ancestors and the progeny of an animal differed no more from it than its contemporaries. This was actually a *theory,* because the distant ancestors of existing species were not known or recognized as such. But the principle 'like begets like' was not often explicitly stated as a theory. It was rather revered as a 'law of nature,' or else simply carried along as a tacit assumption.

How good was this assumption? It was pretty good, because it did serve to organize knowledge about the structure of animals. But it was not good enough, because a false conclusion was drawn from it, namely, that each species must have come into existence separately (especially created).

The assumption introduced by the evolutionists, namely, that successive generations of animals tend to be modified in the direction of greatest adaptation to their environment, was an explicitly *theoretical* assumption. As such, it stimulated observations along lines very different from those which governed the work of the earlier biologists, and as a result its impact upon biology was truly revolutionary.

Experimental method depends on the existence of theories. Before an experiment can be performed, it must be planned and designed. It must have a purpose, which is usually much more explicit than 'just to see what happens.' Certain definite results (or at least a set of alternative results) are expected from an experiment. These expectations are based on the existence of a theory, that is, on previous organization of knowledge and speculation along certain lines.

These things must be emphasized, because, as we have said, there is much identification in the popular mind of science with exclusively experimental (and to some extent observational) techniques. Another reason why the importance of theory must be emphasized, particularly in this country, is that the 'practical' value of experimentation is often recognized, while 'theories' are often considered to be dreams concocted by eccentric professors. It is significant that every American schoolboy thinks of Edison as a great scientist, while the name of Gibbs, perhaps the most illustrious name in American science, is practically unknown. It is not widely understood that no Edison could have done the work associated with his name, had not Galvani, Volta, and Faraday theorized about electrical phenomena without much thought about their practical applications. Nor was it necessary for Edison to be explicitly acquainted with the ideas of Faraday, etc. Ideas have a way of seeping through and giving direction to the interests of men without these men becoming aware of the influence.

And so we will regard it as established (and it will not be denied by any scientist worth the name) that all scientific work (whether the workers were conscious of it or not) has always proceeded by the interactions of these three fundamental methods:

1. Observation and description.
2. Experiment and induction.
3. Theory and deduction.

Theoretical and Quantitative Biology

THE INTERACTION of observation, theory, and experiment can be made most effective by developing ingenious and sometimes very elaborate techniques. There are techniques of observation, techniques of experiment, and techniques of theory. The development of optical instruments is an example of the growth of observational techniques. Apparatus which enables the experimenter to achieve high pressures or extreme temperatures or strong magnetic fields facilitates experimental technique. Applied mathematics is an outstanding example of theoretical technique. Just as a microscope enables us to see things which we could never see with the naked eye, mathematics enables us to draw conclusions which we could never draw with our crude non-mathematical language.

A simple example will illustrate. Suppose our science is land measurement. We are interested in determining the areas of rectangular plots of land. We could proceed by direct observation, that is, measure each lot separately by covering it with squares of one unit area. This would be clumsy and tedious. A development of a theory (namely, that the area of a rectangular plot equals the product of length by width) would reduce the observations to just measuring the adjacent sides of each rectangle. The measurement of rectangular lots would be much simplified, but the theory still would not tell us how to measure

the areas of triangular or circular lots. Now the theory could be pushed still further, so that formulas for the areas of lots of various shapes could be obtained. If, however, we proceeded to obtain these formulas experimentally (like the Egyptians) our knowledge of geometry would consist of disconnected 'facts': the knowledge of one formula would not tell us anything about the others. If, however, we proceeded theoretically (like the Greeks), we could *derive* the formulas for the areas of a great many figures in terms of their linear dimensions. We would then have a unified theory where the facts are organically interconnected. Such organized knowledge is then indeed 'scientific,' i.e., it can be comprehended and transmitted with a minimum of effort and lends itself to further generalizations (it lends itself most easily to the process of time-binding).

Mathematics is a technique and as such can be used in all three methods of scientific research; description, experiment, theory.

There is, for example, *quantitative descriptive biology*. A description of a quantitative variation of some characteristic within a species would be the concern of a biometrician. He would talk about averages, standard deviations, medians, norms, and other statistical parameters. His method would be quantitative. But unless he postulated some general principles and used mathematics to *deduce* these distributions of the characteristics from them, his method would not be explicitly theoretical.

There is also *quantitative experimental biology*. A physiologist who experiments on animals and makes elaborate measurements of his observations and perhaps fits these measurements by curves which can be described by mathematical expressions is using the quantitative experimental approach. It is not explicitly theoretical unless the physiologist uses his mathematics to derive his observations from previously postulated principles.

On the other hand, there is *theoretical biology* which is not quantitative. Since psychology is now properly considered a biological discipline, the various theories of personality and behavior developed by Freud, Adler, Jung, etc., may properly be considered as belonging to theoretical biology. In them, attempts are made to deduce patterns of behavior from general principles. Yet the principles are not stated in quantitative terms, and the methods of deduction are not mathematical. Therefore this method is theoretical but not quantitative.

Now I hope it is clear what is meant by the statement that the method of mathematical biology is both theoretical and quantitative.

It is theoretical because it proceeds by deduction from general principles rather than by experimentation or direct observation. It is quantitative, because its formulations and conclusions are stated mathematically.

How is the method of mathematical biology related to other methods of biological science? In the same way that theory is related to observation and experiment in other branches of knowledge. The three methods are entirely

interdependent. No one is adequate. Still among scientists, as among other workers, there is a distinct division of labor. Some specialize in observational techniques (the histologists, for example); some devise and perform experiments. Mathematical biologists specialize in designing and developing deductive techniques applicable to biological theories. Their job is the following: given that certain things are true about cells, tissues, organisms, or aggregates of organisms, what other things can be deduced to be true?

The Model

USUALLY the first step in this procedure is the construction of a 'model.' By construction we don't mean an actual building of a replica of the 'real thing,' as is often done by engineers. The construction is entirely mental. To illustrate, we will first describe a typical model of a theoretical physicist and then pass to biological models.

About a hundred years ago, the creators of the so-called kinetic theory of gases constructed a mental model of a contained volume of gas. They thought of the gas as consisting of a tremendous number of tiny perfectly elastic balls that flew widely about the container in straight lines unless they hit a wall. They were supposedly so tiny that they never collided with each other. When they hit a wall, they would bounce exactly according to the laws of elastic impact.

The important thing about this mental model of a gas is that its inventors did not say it was necessarily a true picture of the situation. All they said was 'If it were a true picture, these would have to be the consequences,' and proceeded to deduce the consequences. The consequences turned out to be much like the actual behavior of gases under various conditions. From the extremely simplified 'elastic ball' picture of gas molecules the famous inverse relation called Boyle's Law between the volume and the pressure of a gas could be mathematically deduced. If the size of the molecules was not neglected, so that interactions among the molecules themselves could be taken into account, the more exact pressure-volume relations of Van der Waals and others could be deduced. If another assumption about the so-called 'equipartition of energy principle' was added to the picture, other aspects of the behavior of gases could be mathematically deduced, such as the relation between volume and temperature, and even such seemingly unrelated things as the relations between the two kinds of specific heat of a gas and the propagation velocity of sound through the gas. All of these deductions of the kinetic theory of gases based on a mental model were spectacularly confirmed by quantitative experiments. Not only that but relations were predicted by the theory, which were previously unknown, and these too were borne out by experiment.

Such is the role of theoretical models. They can sometimes be considered as simplifications of reality. But they need not be even that. For a long time our knowledge of static electricity was organized into a model according to which

positive and negative electricity were depicted as fluids which flowed within electrified bodies. There are really no such fluids. But this way of talking about static electricity suggested experimental and observational procedures which gradually enhanced our knowledge.

Mathematical biologists also construct models. We shall examine two of them, a model of a living cell and a model of the central nervous system.

An early model of a living cell was constructed by Rashevsky. He thought of a cell as a sack containing a fluid, in which there were dissolved various substances interacting in the metabolism of the cell and various catalysts of the reactions. There was also a diffusion of the substances from inside the cell through the walls into the surrounding medium and vice versa.

Rashevsky showed by mathematical analysis that if a substance were produced at a uniform rate throughout the cell, the steady state concentration of the substance would vary through the cell, being greatest near the center and smallest near the walls through which it diffused. The mathematical expressions for this gradient of concentration were derived. Rashevsky further showed that if drag forces were present in the cell fluid, these forces would tend to act in such a way as to distort the cell, namely elongate it along a certain direction. When the elongation had proceeded to a certain extent, other forces, namely, the surface tension of the membrane would come into play 'pinching' the elongated cell in the middle. Under certain conditions this process would continue until the cell divided.

Stated this way in qualitative terms (that is without mathematics) the theory seems to provide an 'explanation' for cell division. But explanations are not to be taken too seriously if only because they are usually quite easy to invent. If many different explanations for the same phenomenon can be invented, how are we to know which one of them, if any, has any bearing on the real process in question? If, however, the explanation is mathematical, the situation is quite different. Rashevsky's mathematical model of the dividing cell describes not only how the various forces act, but also *how much* they act at each stage of division. These quantitative relations are not guessed at or invented but follow as mathematical consequences of the model and of known physical and chemical laws. If now *quantitative* predictions are accurately borne out by experiment, the theory is given a much stronger support than is given by the mere fact that it provides a general explanation of the events.

Figure 1 shows to what extent the quantitative predictions implicit in Rashevsky's model are borne out by observation. The points are the observed values of the variable in question. The curves are the graphs of the mathematically computed relations between the same variables. The fit of the curves is as good as any fit obtained in physics, which is generally considered as an exact science.

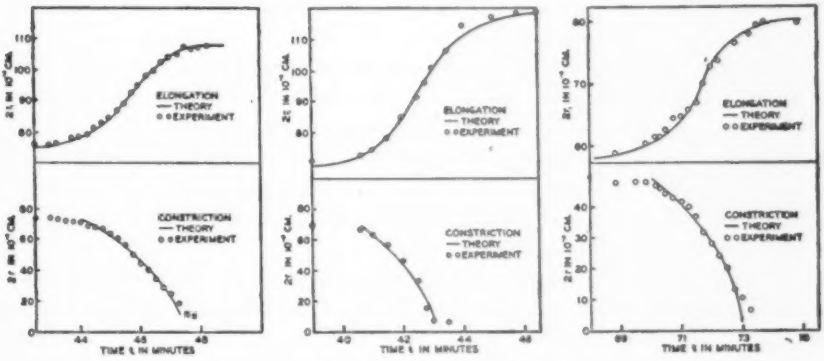

FIGURE 1.

The Meaning of Parameters

HOWEVER, the success of the mathematical theory is in reality not nearly as triumphant at this point as the agreement between observation and prediction seems to indicate. The situation is as follows. The theory predicts a certain relation between certain variables — in this case two pairs of variables — the amount of elongation plotted against time in one case and amount of constriction against time in the other. However, the mathematical expressions which determine the theoretical curves contain many other quantities, which are assumed to be constant for the given case, but which are nevertheless unknown. We will illustrate by an elementary example.

The equation $y = ax + b$ indicates that if y is plotted against x, the graph will be a straight line. But it does not say *which* straight line, i.e., it does not give the position or the direction of the straight line. This means that *any* set of points which lie in a straight line can be 'fitted' by an equation of the form $y = ax + b$. It is also true, however, that if a set of points are not in a straight line, they cannot be fitted by such an equation.

Let us now suppose that our theory predicts that the relation between two variables y and x is given by $y = ax + b$. Let us suppose also that the experimental values of y and x when plotted do give a straight line. How good is the theory? It is good to the extent that it has predicted that the observed values will lie in a straight line, but it has *not* predicted the exact straight line along which they will lie, if the quantities a and b are not known. To fit the theoretical straight line to the observed values certain numerical magnitudes must be assigned to the unknowns a and b. These unknowns are called *parameters*.

The more unknown parameters there are in the theoretical equation, the easier it is to fit the curve to any given set of values (by assigning proper values to the parameters). Therefore the more unknown parameters there are the

less significant for the success of the theory is the fact that the observed values may be fitted by the theoretical curve.

Nevertheless not every set of points can be fitted by every equation. For example, if the experimental points lie on a curved line, no amount of tampering with the parameters will enable us to fit the graph of the equation $y = ax + b$ to those points. *Some* predictive value is contained in practically every theoretical equation which fits the data. Furthermore, the less the number of unknown parameters, the less likely it is that the fit is accidental, and therefore the more powerful the predictive value of the theory.

There is one other aspect to curve fitting which brings out the power of the theoretical-mathematical method. In order to fit a curve, as we said, values must be assigned to parameters. These parameters, however, are not simply numbers. They have a definite physical or biological significance in the context of a particular model. They measure something. Hence the assignment of values to parameters is equivalent to estimating certain quantities. Often there is no direct way of measuring these quantities. In this case, the theory provides useful guesses which can be used as working hypotheses in the development of the theory. If, however, the quantities can be measured, then the theory indicates certain experimental procedures, which might not have occurred to the 'non-theoretical' experimentalist.

Models of Nervous Processes

THE TWO most fundamental life processes seem to be the transformation of energy and the transmission of information. Transformation of energy is the result of chemical processes taking place within the cells, the building blocks of the organism. Transmission of information is a result of propagated processes, which may be chemical, electrical, or even, perhaps, mechanical. As a result of such processes events at one end of the organism are able to influence the events at another end. One system along which the greater portion of such information is transmitted in higher animals is the central nervous system. Its units are highly specialized cells called neurons. They are characterized by their ability to 'pass on' a state of excitation to their neighbors.

Mathematical biologists have constructed several theoretical models to account for the observed facts of the propagation of impulses. According to one such theory impulses may be either excitatory or inhibitory, and the same neuro-element (thought of as a bundle of neurons) may be the carrier of both kinds of impulses. Certain exceedingly simple principles are postulated according to which 'excitation' (whatever its character may be) is thought to accumulate at a synapse (junction between two neurons), when one of them is in an excited state. In general, the greater the activity of that neuron, the faster is excitation built up at the synapse. When the excitation at the synapse reaches a certain critical value, the other neuron of the juncture becomes excited. It

turns out that the greater the activity of the first neuron, the smaller the 'synaptic delay,' i.e. the time it takes for the second neuron to become excited. This however is only a qualitative statement. Mathematical deduction enables us to write down explicit mathematical expressions governing this relation.

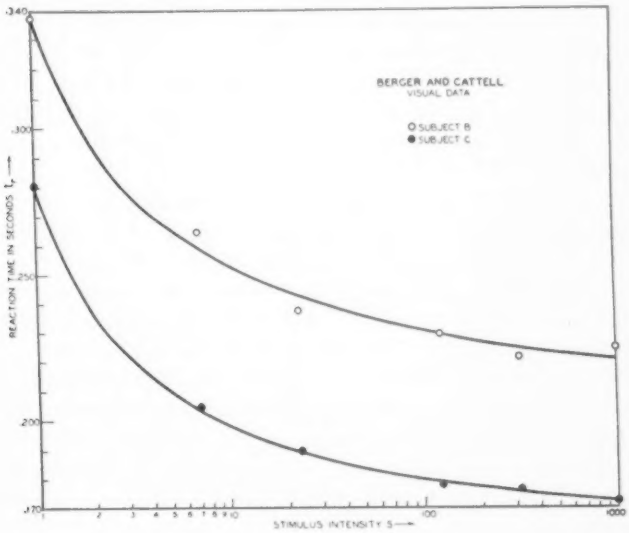

FIGURE 2.

Figure 2 shows to what extent experimental findings (circles) agree with the predictions of the mathematical theory (solid curves) concerning the relation between intensity of stimulus and quickness of response (since the latter depends on the delays at the synapses if it is supposed that the speed of propagation along the nerve fibers is independent of intensity). Again it must be pointed out that the excellence of agreement is simply an indication of the validity of the theory, by no means a proof. But, on the other hand, it must be stressed again that the mathematical theory does not end with the curve fitting. The very process of curve fitting necessitates the assignment of values to unknown parameters, which gives us an indication of what the values of some biological quantities may be in addition to the variables considered. Again, if there is no direct means of measuring those quantities, the theory provides us at least with some guesses. If there is a direct means of measuring them or an independent theoretical method of computing them, the theory gives significance to new experiments or provides a link to other theories (if the same values are deduced by two *independent* theories, both are strengthened, just as when two persons do a long sum independently and get the same result, we are justified in feeling confident about it).

The Nervous System as a Whole

SO FAR we have considered the microcosmic aspects of the organism, the events within a single cell or at a single synapse. Can these methods be extended so as to include the gross macrocosmic aspects of the organism? We know that the body of an organism is a conglomeration of cells, and, in particular, its nervous system is a conglomeration of neurons. But these aggregates do not add up to a functioning organism any more than a pile of bricks adds up to a house. How can we pass from the consideration of the activities of single cells or single neurons to the activity of the organism-as-a-whole-in-an-environment?

Certain methods designed to solve this theoretical problem are claiming increasingly more attention of mathematical biologists. These are the so-called probabilistic or stochastic methods. They have enjoyed brilliant success in physics and in astronomy in providing a link between the theory of motion of a single particle (developed by classical mechanics) and theories which treat the behavior of vast numbers of particles, such as the kinetic theory of gases. Probabilistic theories have already been applied for many decades in quantitative social science, such as population studies, actuarial statistics, etc. These studies enable us to predict to a certain degree of accuracy the behavior of great numbers of people, even if the laws governing the behavior of single individuals and the interactions of single individuals are not developed to anything like the same accuracy.

There is now developing a probabilistic theory of the central nervous system. In it certain simple assumptions are made concerning the behavior of individual neurons and the interaction of single neurons. These assumptions are drastic simplifications, just as the model of a cell as a little sack of fluid is a simplification and the model of the molecule as an elastic ball is a simplification. But out of these simplifications the behavior of the whole system can be deduced if certain probabilistic assumptions are made about the structure of the system. In the present state of the theory, theoretical models are being constructed, that is, simple structures are postulated and their behavior is deduced by mathematical methods. When the model behaves in a way which reminds us of actually observed psychological phenomena, the theory is pursued further.

Learning curves have been known in experimental psychology for a long time. If an animal is confronted with a choice of two actions, one of which is rewarded, the other punished, in due time he will learn to make the 'right' choice. If one plots the number of wrong choices the animal makes against the total number of choices, one gets the so-called 'learning curve.'

Now there exist in mathematical biology models of nervous systems capable of learning. On the basis of the structure of the systems and some probabilistic considerations about the fluctuating (unpredictable) aspects of be-

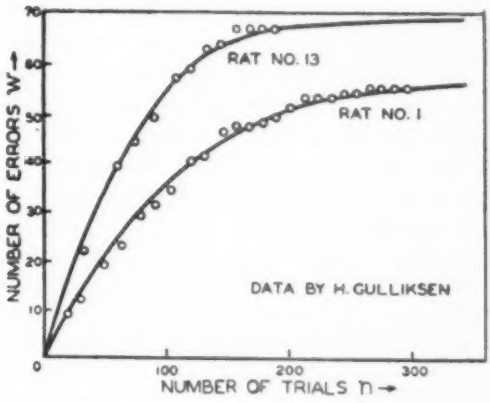

FIGURE 3.

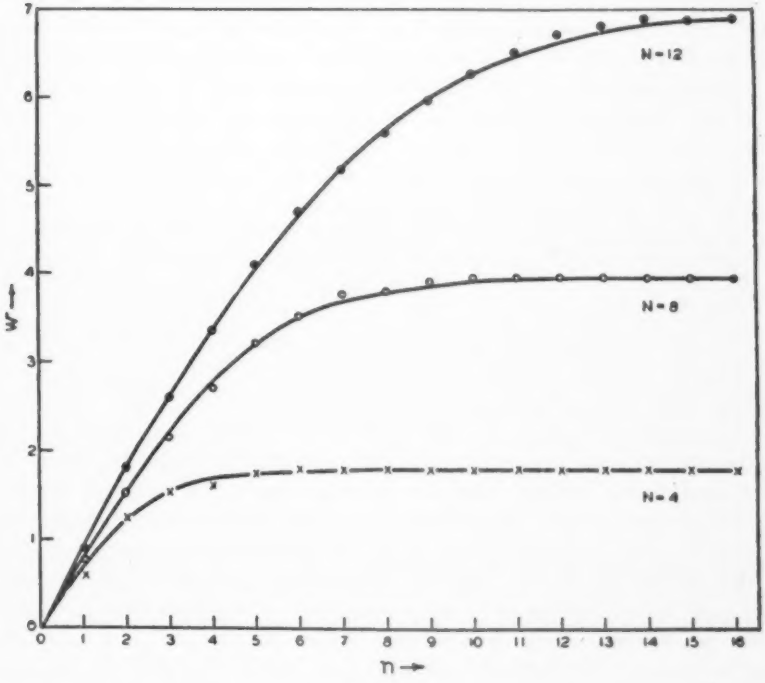

FIGURE 4.

havior, mathematical expressions describing such learning curves can be derived.

In Figure 3, we see the extent of agreement between theory and experiment for the case of learning curves in rats. Again the closeness of fit is not the important thing. Important are the by-products of the theory. In order to fit the curves, certain parameters had to be assigned values in each of the two rats. As is apparent from Figure 4, one of the rats made more mistakes in the beginning of the learning situation than the other, but he also reached the 'plateau,' i.e., perfect performance level ahead of the other. The parameters describing the learning apparatus of the two rats indicate the possible reason for this difference. If the theory is valid, it indicates that the first rat is more intelligent than the second, but that he was handicapped by a bias against the correct choice in the beginning of learning (as, for example, being left-handed, when the correct choice was a turn to the right).

Figure 4 shows the average learning curves of a large group of human subjects confronted with memory tasks of various complexity. Again the mathematical form of the curves was computed by the methods of mathematical biology. The gratifying thing about these curves is that they contain only two parameters. This means that only two of the three curves were 'fitted' by assigning values to the parameters. The third curve was completely determined without any free parameters. This is one instance in which the theory was able to predict not only the general characteristics of the curve but also the specific curve and its exact position.

Information and Intelligence

STILL ANOTHER CONTRIBUTION to the mathematical theory of the nervous system was inspired by the work of communication engineers during the war. These engineers were faced with a new kind of technological problem. It is a help in understanding this problem to place it in historical perspective.

The earliest technological problems were concerned with the transmission of force and the storing of muscular energy. Levers and wheels were known in the ancient world. They were the principal components of all the ancient machines, pulleys, catapults, wedges, etc. All of them used human and animal muscle as the driving force. The problems solved in ancient technology were only the problems of the efficient utilization and concentration of muscular energy. Clockworks which made their appearance in the XVII century went a step further in providing means of *storing* muscular energy and releasing it at convenient rate.

The technology of the XVIII and XIX century went much further. It was concerned with transforming chemical energy into other forms (such as mechanical or electrical). This transformation made possible on a much more extensive scale the transmission and the storing of energy. Even more significantly, it allowed man to dispense with the muscular sources of energy. It made slavery

unnecessary. The rise of a vast white collar class is a consequence of the fact that less people are making a living today by selling muscular energy. Instead the labor market demands some sort of intellectual energy, skills and training, where at least some 'decision making' is required. While it is true that mass production methods have dispensed with a great many skills and have substituted automatic operations for them, it is also true that many other skills have taken their place, mostly skills of evaluation and decision rather than skills of manual training.

The third kind of technology, which is now developing, is concerned with decision-making apparatus. In addition to the strong dumb slaves, the dynamos, turbines, etc., there are now being invented intelligent mechanical slaves, computing machines, IBM machines, differential analyzers, etc. The main problem in this technology is not the transmission of force as in the ancient levers, not the transformation of energy as in the engines, but rather the transformation, transmission and storing of *information*.

The communication engineers, who were preoccupied with these problems and who were building their computers, their fire control devices, radar equipment, etc., were impressed with the analogies between these special machines (automata) and the functioning of what is commonly called 'intelligence.' This has led to the formulation of mathematical theories (still in an embryonic state), in which the functioning of nervous systems is assumed to proceed on the same principles as the functioning of the 'intelligent' machines. This field of inquiry has been given the name of *cybernetics*. Some of the mathematical biologists of the Chicago group are attempting to combine the probabilistic approach to the structure of the nervous system with some of the ideas inherent in the mathematical theory of communication and cybernetics. This brings us to the frontiers of the theoretical development of mathematical biology in the field of individual organisms. This, however, is not all. If organisms are aggregates of cells, populations and societies are aggregates of organisms. The same methods which have linked individual cells with the organism-as-a-whole are being applied to link the organism with society. In fact a probabilistic methodology in the study of social structures and mass behavior is the subject matter of two books by Rashevsky.[1]

Aims and Tasks

So much for the methods. What then are the aims and tasks of mathematical biology? They are first of all concerned with making biology a deductive science (as physics and chemistry have largely become). There are two

[1] This extension of the method to social science is found in *Mathematical Theory of Human Relations*, Bloomington, Ind.: The Principia Press, 1947, and in *Mathematical Biology of Social Behavior*, Chicago: University of Chicago Press, 1950.

advantages in a science being deductive: it acquires inner consistency and interdependency. In a deductive science only few things are what they are because they are what they are (the irreducible principles or postulates). All other things are as they are because they *must* be. Such a state of affairs gives us confidence in the orderliness of the universe. What is orderly can be understood and need not be feared. It can even often be controlled. The other advantage is that a deductive science usually becomes linked to other sciences (as, for example chemistry has become linked to physics, and psychology is becoming linked to physiology). The linking of sciences brings orderliness in the whole realm of human knowledge. It is the express purpose of mathematical biology to link biology with physics and chemistry. That this can be done is to some extent a matter of faith but by no means of blind faith, because there is ever increasing evidence of the intimate relations between the principles of physics and chemistry on the one hand and those of biology on the other.

Man is an organism. Therefore the science of man is primarily a biological science. Social science should be considered as a logical extension of biological science (the study of interacting organisms). Hence man in society also is a legitimate subject of biological inquiry. The ultimate aim of mathematical biology, therefore, includes the purpose to contribute to the science of man by the use of the physico-mathematical method of research which has proved so tremendously successful in the physical sciences.

General semantics is also concerned with the science of man. Its special contribution is toward the study of the *evaluative* behavior of man. The most crucial and distinctive component of man's evaluative behavior is the neuro-linguistic (symbolic) process. Hence general semantics is directly concerned with the functioning of the human nervous system, particularly its evaluative function. Obviously there is a large area in common between general semantics and mathematical biology. But the intimacy is even more profound than is indicated by the common field of inquiry. We have pointed out that mathematical biology utilizes the physico-mathematical method and is committed to it as an instrument of research. For the general semanticist, however, this method is more than an effective tool of research. According to general semanticists, when man behaves 'mathematically,' he behaves at his *best*. Furthermore, according to the general semanticists, one need not be a mathematician to behave 'mathematically,' although it helps. The spirit rather than the technique of mathematics is important. Mathematics is the language of *structure*. It is the language of science although paradoxically it says nothing whatever about the world. It is an 'as if' language, an 'if so, then so' language, a language of relations rather than of subject-predicate identifications, such as most of our crude languages are. It is for this reason that mathematics has been so successful in giving us an understanding of the world. To behave mathematically means to a general semanticist to use language as scientists use mathematics:

1. To be aware that the language is not the world it describes.

2. To be aware that language is possible because we make abstractions in in our awareness of the world. Therefore no language says *all* about the world (this is obvious in mathematics).

3. To be aware that there is no limit to the degree of abstraction possible in language and to be aware of the difference between the various levels of abstraction (this awareness comes naturally and obviously in mathematical thinking).

There is a conjecture in general semantics (made by Korzybski), that the human nervous system functions on various levels of abstraction because of the various levels of organization inherent in it. According to him, sanity is intimately connected with the process of 'atuning' somehow these levels to our evaluation of reality so that they correspond to the structure of reality. This 'atuning' takes place when man behaves scientifically (i.e., mathematically). Similarly, unsanity is a confusion of abstraction levels and perhaps insanity is an aggravation of this condition. For the general semanticist, therefore, the principles embodied in physico-mathematical method are not only tools of research but a way of life.

We live in a world of change. If a body of law were in existence adequate for the civilization of today, it could not meet the demands of the civilization of tomorrow. Society is inconstant. So long as it is inconstant, and to the extent of such inconstancy, there can be no constancy in law. The kinetic forces are too strong for us. We may think the law is the same if we refuse to change the formulas. The identity is verbal only. The formula has no longer the same correspondence with reality. Translated into conduct, it means something other than it did. Law defines a relation not always between fixed points, but often, indeed oftenest, between points of varying position. The acts and situations to be regulated have a motion of their own. There is change whether we will it or not. BENJAMIN N. CARDOZO, *Paradoxes of Legal Science.*

✯ DISCUSSION ✯

THE CRITIC AS INTERLOCUTOR

JOHN CAFFREY *

A POEM, with its pleasurable and formal arrangement of language symbols, is ostensibly a culturally specialized communication. Its quality, like that of all communication, is not inherent or intrinsic but dependent upon its signific relations to each reader's experience. If a poet's work creates in one other person's mind images or illuminations resembling those in his own, the poet has succeeded, if only to an extent measured by the size of his audience, in signifying and extensionalizing his sensations.

A poet who does not intend to communicate is writing excrementally, and the social values of his work are limited to those which may incidentally appear in his own psychotherapeutically improved relations with others or with 'himself.' He may as well weep or spit. Mere expression is an end unworthy of the time and effort of anyone else, except a psychiatrist, but we may willingly spend considerable effort in comprehending a communication. The function of a critic is to make clear to a layman, like myself, the character of a poet's communication or, at least, to assure me that a communicable content exists in a particular work.

In analyzing a communication of any sort, we are concerned with three problems: end, content, and form. The end of greatest importance is the creation of understanding of the extensional world, no matter how oblique the incident symbols may be. If pleasure becomes an equally important end or by-product, the result is art. Content is what one wishes to say, the special understanding to be created in the one for whom the communication is intended. Content, together with considerations of end and media, determines form, and form is thus an inseparable aspect of both content and end. The presumable basic intents of a writer are to cast light, to give pleasure, or to stimulate or modify action, and 'good' writing probably realizes all of these intentions. The presumable basic intents of a poet are to provide communication with beauty, to give knowledge with pleasure, in sequences and patterns of language and symbols which recreate in affective terms the interactions between himself and events in his perceived world.

* Department of English, Sequoia Union High School, Redwood City, California.

Poetry's Karl Shapiro has lately enunciated [1] his 'now considered statement' of a view of criticism, and with it, of contemporary poetics, which seems barely compatible with any esthetic holding *communication* to be a prinicpal end. If he is justified in assuming that 'the recent dissolute attacks on the new poetry and the New Criticism have brought about a kind of crisis in the literary life of this country,' we may share his alarm long enough to examine briefly the nature of this crisis as seen from another frame of reference: that of the 'semantesthetic' [neologism mine] postulations upon which such a challenging beginning has recently been made.[2]

The nature of any body of poetry determines the role of its critics. If poetry is communication, the degree to which the services of a critic-interlocutor are required for its comprehension is a measure of the success of the act of communication as well as of the 'difficulty' (i.e., altitude on the scale of abstractions or remoteness from common experience) of the content. The role of the critic, as outlined by Mr. Shapiro, is to free the poet from the responsibility for communication with a *general* audience. The critic does this by attempting 'to help form the contemporary sensibility, to evaluate scientific values (especially as they have informed literature), to discuss the need of religious sensibility, and most of all to examine the structure of poetry.'

The critical function which Shapiro approves is frankly 'doctrinal.' It *forms* sensibility: and in such a way that attention is focused on the pattern rather than on the materials. He quotes, with approval, T. S. Eliot's 'Not our feelings, but the pattern which we make of our feelings is the center of value,' but Eliot's charming sentence is capable of more than one interpretation. Elsewhere, Shapiro maintains, paradoxically, that the old form-content dichotomy in criticism is a reflection of discredited 19th century poetics. Yet a pleasingly designed house of shoddy materials will not fulfill its promise. As long as it is possible to take inchoate material (a lump of clay, an emotion, words) and give it form (vase, sonnet), there are two *distinguishable* (even if inseparable) elements: form and content, and most contemporary esthetic seems to demand that the former derive from the nature of the latter. Most modern ceramists, for example, believe that an object made of clay should *look* as if it *had* been, and it seems reasonable (though reason is suspect in Shapiro's cosmos) to draw an analogy that a poem should likewise provide communicable evidence of its 'materials': both the emotional experience from which it derives and the lan-

[1] Karl Shapiro, 'What is Anti-Criticism?' *Poetry* 75.339-351 (March 1950). All quotations from Mr. Shapiro in this discussion are from this essay, except as noted. Like many contemporary critics, Mr. Shapiro is concerned with 'modern' poetry as distinct from poetry which happens to be written in this century. He points to John Donne, as today's critics often do, as the first 'modern.'

[2] See for example Hayakawa's Chapter IX, 'Art and Tension,' in *Language in Thought and Action* (New York 1949), 143-154.

guage by which it is symbolically 'brought under control' and shared with a reader.

Shapiro detects the enemy of literature or the anti-critic by the latter's demand for *paraphrasable* meaning in poetry. This he cannot allow:

> To the anti-critic any departure from the immediate area of the paraphrasable meaning is . . . . a sign of wilful obscurantism.
>
> Paraphrase must translate out of poetry its semantic content, and this is a recognized violation of the integrity of poetry. . . . Now a really paraphrasable poem is probably not a true poem.

But when we say that a given poem has 'semantic content,' we are saying that its symbols *have referents,* intensional, or extensional, and — more important — that it is possible to perceive the multiple *relations* between the poem's symbols and referents at the various levels of abstraction through which it moves. If I do not understand that the poet means 'Life' when he says 'the sun,' I should still be able to make some sense out of what he has to say about the sun. Otherwise poetry becomes cipher, and its study cryptography. Susanne Langer has, it seems to me, defined the problem of meaning versus paraphrase in an illuminating way when she maintains that,

> . . . . though the *material* of poetry is verbal, its import is not the literal assertion made in the words, but *the way the assertion is made.* . . . The poem as a whole is the bearer of artistic import, as a painting or a drama is. We may isolate significant lines, as we may isolate beauties in any work, but if their meaning is not determined and supported by their context, the entire work, then that work is a failure despite the germ of excellence it contains. . . . The material of poetry is discursive, but the product — the artistic phenomenon — is not; its significance is purely implicit in the poem as a totality, as a form compounded of sound and suggestion, statement and reticence, and no translation can reincarnate that.[3]

THERE ARE other avenues of approach to *meaning* (my synonym, hopefully tendered, for 'semantic content'), and some modern poetry blocks those, too. To say something 'in other words' is only one way of clarifying meaning. What we demand is not paraphrase but referents, and symbols competent to designate them for more persons than the poet and his critics. If I am asked the meaning of 'cactus,' I can point to one, draw a picture, compare it to a thistle, or to a pincushion in reverse, etc. I can define a metaphor like 'red chords of music' by comparing them to 'blue' chords (as in jazz), by playing or writing some which suggest the color or symbol *to me,* etc. Failure to explain 'in other words' (intensionally) is of no moment if some extensional referent for the symbol exists. 'Connotations' must come next in order of comprehension.

Shapiro maintains, further, that 'a highly paraphrasable poetry is equivalent

[3] Susanne K. Langer, *Philosophy in a New Key* (New York: Mentor Books, 1949), 212-213.

to a highly representational art, and both, in a period like ours, are liable to degenerate into escapist art.' This is a fine instance of patting high level abstractions this way and about until they assume a 'meaning' compatible with one's convictions. We can just as readily extend this argument in the opposite direction. For example:

Quoth the anti-critic: As we approach the representational in art, we abstract increasingly less and represent, directly, increasingly more detail until 'reality' is achieved — in appearance. 'Paraphrasable' poetry, however, has actually moved from 'non-paraphrasable' poetry toward *greater* abstraction; the concrete, sensory, direct, expressionistic, 'obscure' poetry of our time is 'obscure' because its idiom is so personal, so little abstracted, so highly representational of the inner states of the poet who (as spoken of by Shapiro in a context of approval) 'has apprenticed himself for long years to his personal exile, fantasies, and neurosis of words.'

The 'simpler' the poem, the anti-critic might continue, the more abstract and less representational it is. Modern poetry, by its increasingly representational concreteness of idiom (a factor perhaps contributing to its density), often leaves the poet the incommunicado prisoner of critics who must draft an interpretive *habeas corpus* and abstract general meanings from the represented details before the poet can be released for general circulation. Now a sketch by Matisse may suggest by a few lines the form and details of an entire arm: very abstract, non-representational, and 'simple.' In a Picasso abstraction, the arm may be a pure geometric pattern: more abstract, even less representational, and yet as finally 'simple' and 'paraphrasable' (i.e., communicable in more than one way or in other terms) as possible. Yet as a *communication* 'about' an arm, Picasso's drawing will have no value unless the 'arm-ness' of the detail is apparent in context or title, no matter how great its pleasure-value as pure design.

The foregoing is word-frolic, verbal acrobatics, intended partly as an 'answer' to a critical pronouncement and partly as an example of the fun a critic may have with cirro-cumulus upper-stratum abstractions, by which almost anything the critic *likes* can be 'proved' excellent.

SHAPIRO maintains that 'the modern poet must either draw away from *simplicity as a doctrine* or draw closer to the *pseudo-modern* idiom of the propagandist, the advertiser, and the jingle-writer [italics mine].' Why this two-valued opposition? Is superficiality the only alternative to complexity, to unfettered balloons of abstraction, and to symbols innocent of accessible referents?

Shapiro's argument is complicated by his insistence that 'The criticism of analysis is really a criticism of the poem being analyzed,' and that to attack a view of the modern critic's function as directive ('to help form the contemporary sensibility') is to attack the modern poet. He will not allow the general reader to be his own critic. 'The supposed equality of critical judgment [is based]

upon a false analogy to the rights of democrats.' How did 'equality' creep into this? What's the matter with 'independence' as one alternative?

This view of the function of criticism and of '20th century poetics' is exclusive of popularity. Shapiro would undoubtedly like to amend Whitman's line, which has long been *Poetry's* declaration of policy toward readers, to read 'To have great poets there must not be great audiences too, but, rather, great critics.' He seems to feel that it is not the task of the critic to win 'great' (which Shapiro seems to equate with 'large') audiences but to fend them off, for they are destructive of real poetry. This attitude is exemplified in the assertion that 'it is easy for the poet to confuse critical recognition with fame, or vice versa; whereas most of the time the two things are deeply incompatible. A great poet may indeed be popular, as may a great poem like *The Waste Land*. But its popularity is suspect; *it is probably popular because it is famous* [italics mine]. . . . Furthermore, the popularity of a poem like *The Waste Land* is somewhat damaging to its reputation. [Just a moment! *Popular* because *famous?* but its *reputation* is thereby damaged? . . . Well, to continue:] The thought of a really popular *The Waste Land* makes us shudder. For instance, parts of it would be used in advertisements.' Very appropriately, too; might even have a salutary effect; but how would the quality of the poem thereby be decreased? 'What the great audience comes to really we know very well; a million people watching the same film at the same time; a million best-sellers being loaded into freight cars.' If the film is a good one, why not *many* millions? What has the size of the audience to do with the quality of the work? Is its quality found as an inverse proportion to the number of people who like it? The critic is standing in a marsh if he must hastily reconsider his approval of something when it becomes popular. If he assumes that widespread acceptance or approval is a sign of an inferior work, the job of spotting superior work would be as simple as dusting off uncirculated slim volumes in a library stack.

> The truth that the anti-critic holds to be obvious, that there can and must be a great audience, the poet holds to be a falsehood and a threat to his singleness, his integrity. The poet who has carried on a flirtation with the audience one day discovers to his shock that the audience *lumps good and bad work together without any apparent rationale,* and that it can only dimly divine the difference between authentic and imitative writing, and original and second-hand writing.

I HAVE italicized that part of this statement which seems to me to contain the germ of confusion, the assumption that there is a necessary and holy connection between referent and symbol. This predicate might be translated, for instance, as 'selects what it likes despite the theories of critics' — but that would be to suggest less kindness than I actually feel toward the critic.

Much excellent modern poetry would not have come to our attention or have survived but for the critics who have saved it from scorn or oblivion.

The most useful critics have apparently taken infinite pains to counter the popular charge of obscurity leveled at modern poetry by proving to the satisfaction of the laity that the content was worth the diligence which its comprehension required of the reader. Many of us who lack adequate training have had occasion to be grateful to a critic for opening the door to our great pleasure and understanding in the work of a Joyce, a Pound, a Lorca, or an Eliot. Eliot himself has recognized the real utility of criticism here.

> *Qua* work of art, the work of art cannot be interpreted; there is nothing to interpret; we can only criticize it according to standards, in comparison to other works of art; and for 'intepretation' the chief task is the presentation of relevant historical facts which the reader is not assumed to know.[4]

However, when a critic exceeds his intermediary office and states that a particular poem is 'good,' 'bad,' 'modern,' or whatever, I shall be impressed by his opinion only to the extent to which he has in the past bolstered my faith in him by leading me to understand what a poet was trying to say or to believe that the poet had anything to say at all.

To say that a poem is 'good' is to say nothing about the poem but much about the critic. I know nothing about the poem until I have read it or heard it, and if I agree that it is 'good' (perhaps for different reasons), then there are at least two of us who think so, but I am smugly undisturbed by a contradictory *opinion*. The fact that I prize, say, Ezra Pound above Edgar Guest does not mean that one poet's work is 'better' than the other's. My reaction, or that of a thousand critics, could not establish any *fact* other than the statistics of preference.

Enlarging a metaphor from semantics, if the poet creates the landscape, the critic is his map-maker. If I travel the territory the critic has described and find that my observations coincide, even roughly, with his, I shall be comforted. If I do not so find, it may be that (a) the map is wrong or that (b) I do not know how to read a map. But the *quality* of the territory through which I pass is a function of sense-evaluation. I may like Nevada deserts, while the map-maker may like the Maine coast, and whether or not our preferences coincide is unimportant if the critic draws an accurate map, indicating significant features of either kind of landscape, giving me the altitude of peaks, and showing me what lies beyond them, outside my vision.

To challenge the right of a 'mass audience' to determine for itself what is 'good' and 'bad' poetry is no more ridiculous than to uphold it. The right of choice simply exists, because there is no verifiable or precisely determinable esthetic or affective quality *in* anything. If an audience is unprepared or unable to accept or understand a poet's work, that fact alone is something we may

[4] T. S. Eliot, 'Hamlet and His Problems,' *Selected Essays 1917-1932* (New York 1932), 122.

agree upon. Whether the mass is right or wrong is a nonsense question. If we pursue this notion (that the mass is wrong or destroys by its approval) to its ultimate implication, that poet is 'superior' whom no one understands or approves.

IN SHAPIRO'S picture of the relation between the poet and his audience we see another facet of his concept of poetry and the role of criticism. He seems to rule out the probability of there being a psychically 'healthy' poet — along with the existence of an intention even to communicate with the 'healthy.'

> In the beginning, I believe, the poet does not even have the conception of an audience. Once he has accepted the vocation of poet he is bound to an apprenticeship of many years of silent writing, during which he lives a life of actual or secret alienation from the world. His dissociation from the normal interests and ambitions of his fellows [does he *have* any?] is so marked that it is difficult for him to construct an audience in his mind's eye which will include them.

This lonely Byronic creature, to whom lunch must be brought on a tray by *somebody* in the real world, does not even intend to communicate with us? What is it all about? What have we to do with him? And if he *does* stumble out of what he thinks is an exit and finds himself on the stage with an audience before him,

> He may easily slip and fall into its arms. This is particularly liable to happen if fame takes him by surprise, or if he lives far from a capital city [like Chicago]. His provincialism will serve him badly, as provincialism always does. On the one hand, his true critics will try to save him from good society (which is the poet's name for bad society) [so much for sociology]; on the other hand, good society will hold out its ready-made honors. So the poet may become a poor parvenu, his early paranoia apparently dissolved [worse luck!], and being for the moment at one with the world [help!], he may in false gratitude turn against himself.

Now if the poet, threatened with honors, is liable to turn against himself, dissolve his paranoia, and fall into the audience's arms, then these contortions must be prevented at all costs. By whom? Enter the critic.

If a writer charged with 'obscurity so called' can depend upon the deciphering services of an astute or sympathetic critic, he may regard his potential audience much as a poet writing in, say Russian may regard his potential English-reading audience. If the poet knows that there is translatable content in his work, he may ignore charges of unintelligibility and counter, 'Learn to speak my language or else see my translator-critic, but don't trouble my early paranoia by pleading your insufficiencies.'

A critic may count words or letters or figures of speech, he may trace the etymology of a poem's words, he may note parallels between an image used by one poet and another, he may recount for us the historical context of composition

or quote the critical theories of the poet or of other critics, and he may tell us what this or the other part of a poem 'means' or show the significance of the whole poem in the poet's other works or in the culture of which they are a part; he may even assure us that the poem is 'excellent' or 'imitative,' 'authentic' or 'second-hand,' but his *opinion* is not superior to mine or to anyone else's, for the simple reason that no expression of personal feeling is 'superior,' as uranium is superior to wood as a material for A-bombs. If a poem's superiority were verifiable, questions of inferiority or other *qualities* (as critics use the term) would be nonsense.

These contrasting interpretations of the role of the critic (prescriptive *vs.* descriptive, or directive *vs.* informative functions) probably stem from differences of opinion about the right of the critic to act as an *authority*. Shapiro discredits modern science because, according to him, it excludes whatever cannot be measured and the only authority recognized by scientists is that of controlled experimentation (which even then only establishes strong *probabilities*). There is, among scientists as among semanticists, a great distrust of 'authority' of the 'corroborative statement' variety; the *number* of people (or of critics) who say something should not settle questions of judgment, though it may command our attention.

The critic-map-maker carries no standard tape-measure or surveyor's transit, uses no high-precision instruments, and the articles of his ordination do not require such. His usefulness is determined by the scope, variety, and intensity of his experience with symbolic acts (such as poems) and their referents — with language and life, if you like. His only license is his capacity to point out 'beauty' or 'meaning' where we might have missed or misinterpreted it, and the only 'proof' of his work is in our eventual agreement with him. If a poetic communication can better be understood if seen against a background, and the critic can sketch in this background, or if he can unlock the potentially pleasurable mysteries of what might fail as communication without his catalytic intercession, then his office is justified.

WHAT MAKES a poet 'distinguished,' according to Shapiro? The judgment of his peers and critics, with or (preferably) without benefit of other audience. Upon what do his critics base their judgment? Upon a critical theory of poetry 'which *gains in authority* when we consider that many of the foremost living poets helped create it.' This reasoning has an arrestingly cyclical form.

Indeed, the critics may well have made 'modern' poetry possible. They have provided the poet with what he needs: an *expert* audience, one tolerant of special uses of language. 'Skill in reading poetry requires the kind of preparation and apprenticeship the poet himself undergoes,' Shapiro says. And what *that* involves the psychiatrist must note with joy. T. S. Eliot once wryly remarked that certain lines of his which he had constructed for the beauty of

their sound or appearance, quite independently of communicative intent, had been found by his critics to contain profound thoughts of which the author himself had been unaware. Perhaps, as Shapiro has pointed out elsewhere, poetic communication can just 'happen,' synthetically, no matter what the *intent* of the writer, just as dreams intrude into the consciousness when the bars are down in sleep. Commenting on a 'hoax' poem sent him by a group of anti-critics who had *attempted* to write an unintelligible 'group of unrelated words,' Shapiro maintains, in his reply, perhaps also as a hoax, that the pranksters may 'have made a discovery which may eventually lead to your enjoyment of modern literature: that poetry is not only "inspired" but synthetic. . . . I think you should attempt more poems of the kind you submitted. And if you write them alone [without collaborators], *you will then be performing the poetic act in good faith*' [Italics mine].[5]

IF THE POET can write without an audience in mind, scornful of communication, using words as chips of tile in a mosaic, depending upon the beauty of *pattern* to illuminate his construction, then the 'true' critic may indeed serve a creative function and may eventually supplant the poet by finding 'meaning' where, perhaps, none was intended. The 'New Criticism' has served another useful purpose in allowing the neurotic poet to conserve his neuroses as the fountain-head of 'inspiration.' Similarly, that most confirmed provincial, the capital city-dweller, who knows that his metropolis is *really* cosmopolis, treasures the blights and blessings of his city as integral to the mystic environment which he exploits in his passé preoccupation with The City and The Artist. The more remote the poet from his audience, Shapiro maintains, the better his poetry; one begins to approach an extensional orientation here. We can establish the quality of poetry by measuring the distance between poet and audience, or by a number equivalent to that in an elevator which says 'capacity *n* persons.' There is something Olympian in this vision of the poet as a monk bound by vows of poverty and opacity to an ever-ascending elevator of limited capacity, bearing a banner with a strange device. What better claim to remoteness can we make than to island ourselves with other refugees from provincialism in a great cultural center, there to barricade ourselves behind the authority of the little magazine critics?

Our 'true' anti-anti-critics may not consider themselves or their doctrines and dogmas to be as bourgeois and staidly neurotic as their steerage-class enemies, but the special pleas which all partisans must make for the emergency of their status may deafen them to society's increasing need for clear communication as an instrument for resolving or controlling inner or inter-personal tensions. When the poet ceases to be of service to anyone except his critics, who teem and prosper in their parasitical offices like real estate agents pointing out the ad-

[5] Karl Shapiro, 'The Persistence of Poetry,' *Poetry* 76.91 (May 1950).

vantages of certain exclusive properties, when the poet fails to create pleasure, he has left the stream of 'reality' — without somehow excepting himself from 'history' — to sit playing by himself on the bank. Certainly a poet of integrity (however this may be determined) should be free to externalize his own sensations and indulge his semaphobia, and the critic-translators should be free to blanket poetry's dead limbs with interpretive mistletoe in lieu of other greenness. Still my pleasure or displeasure with any poetry is not abated by the prescriptive 'authority' of criticism, ancient or modern, though I shall always enjoy collecting from the critics droll examples of semantic naiveté such as the following (the italics are mine):

> The argument against modern poetry as a new Art for Art's sake is a *sham argument* in the first place because it is *factually untrue.*
>
> The criticism of analysis is *really* a criticism of the poem being analyzed.
>
> The conception of a great audience for poetry . . . . is based also on the *psychological fallacy* that the untrained mind can instinctively *discriminate between esthetic good and bad.*
>
> The modern poet does not perceive the 'poetic' apart from the prosaic, the cognitive, etc.; where *science confutes religion and art,* and *religion confutes science,* poetry confutes nothing, but encompasses whatever belongs to human experience.

I should be grateful for the services of any critic who could provide me with territories for these italicized maps of the literary high country.

PERHAPS the 'mass' is mistaken, and the 'obscure' poets merely reflect as in a comic mirror the linguistic confusions of the critics, if indeed our busy poets have any time at all for reflection while they struggle to hear the interlocutor's cues over the murmur of a restless audience.

I wonder whether mankind could get along without all these names, which keep increasing every day, and hour, and moment; till at last the very air will be full of them; and even in a great plain men will be breathing each other's breath, owing to the vast multitude of words they use that consume all the air, just as lampburners do gas. But people seem to have a great love for names; for to know a great many names seems to look like knowing a good many things; though I should not be surprised if there were a great many more names than things in the world. HERMAN MELVILLE, *Redburn.*

✯ BOOK REVIEWS ✯

From Science-fiction to Fiction-science

DIANETICS: THE MODERN SCIENCE OF MENTAL HEALTH, by L. Ron Hubbard. Introduction by J. A. Winter, M.D. New York: Hermitage House, 1950. 452 pp. $4.

THE CASE of Lafayette Ronald Hubbard, author of *Dianetics: The Modern Science of Mental Health,* offers an almost unparalleled illustration of the principle held by writers on general semantics that language habits tend ultimately to become internalized. Korzybski said that one's evaluations tend to reflect the structure of the language one speaks; Wendell Johnson has described 'the way the language does your thinking for you' and has said that 'every speaker is his own most interested and affected listener.'

Hubbard is a writer of science-fiction. Before writing *Dianetics* he had written *Death's Deputy* (a novel about accident-proneness), *Final Blackout* (science-fiction), *The Kingslayer* (science-fiction), *Slaves of Sleep* (fantasy novel), *Triton* (fantasy). How many more novels he has written, I do not know, but he has also been an incredibly prolific contributor to science-fiction and other magazines. According to his own account of himself in the 1942-43 edition of *Who's Who in the East,* he had had at that time (he was born in 1911) five million words published under six names.[1] How many more millions of words he has published since then, it is impossible even to guess without at least knowing the names he writes under. But it appears to me inevitable that anyone writing several million words of fantasy and science-fiction should ultimately begin to internalize the assumptions underlying that verbiage. This appears to be what happened to Hubbard; his chef d'oeuvre, *Dianetics,* is the result.

Science-fiction, whether in Jules Verne or H. G. Wells or in the pulp-magazine varieties common on newsstands, is a legitimate enough art form.

[1] The account also states that he is an 'explorer' and names expeditions on which he has gone. He is also a 'licensed commercial glider pilot, motor boat operator, master of motor vessels, master of sail vessels (any ocean), radio operator.' The 5 million published words include writing for '90 national magazines,' for 'Hollywood studios, radio,' and 'two texts on psychology.' He gives his college training as 'George Washington U. Engr. Sch. 1930-32.' On p. 85 of *Dianetics* he also mentions having studied mysticism, 'not in . . . second-hand sources . . . but in Asia.' But for purposes of dianetics he says he found mysticism unnecessary.

When done well, the value of the genre is that, in treating the remotely possible or conceivable as if it had already occurred, it helps prepare the reader for the shape of things to come. (*Twenty Thousand Leagues Under the Sea,* for example, was written in 1869.) But good science-fiction is not too common. Much of it today is written hastily and according to formula, to meet the unceasing demands of the pulps.

I have long felt that there are dangers to the writer as well as to the reader in pulp fiction. It did not occur to me until I read *Dianetics* to try to analyze the special dangers entailed in the profession of science-fiction writing. The art consists in concealing *from the reader,* for novelistic purposes, the distinctions between established scientific facts, almost-established scientific hypotheses, scientific conjectures, and imaginative extrapolations far beyond what has even been conjectured. The danger of this technique lies in the fact that, if the writer of science-fiction writes too much of it too fast and too glibly and is not endowed from the beginning with a high degree of semantic self-insight (consciousness of abstracting), he may eventually succeed in concealing the distinction between his facts and his imaginings *from himself.* In other words, the space-ships and the men of Mars and the atomic disintegrator pistols acquire so vivid a verbal existence that they may begin to have, in the writer's evaluations, 'actual' existence. Like Willy Loman in *The Death of a Salesman,* he may eventually fall for his own pitch.

Of course, there is nothing wrong with literary imaginings as such. Even Frederick Rolfe ('Count Corvo'), one of the great paranoids of literary history, who in *Hadrian the Seventh* pictured in vivid and dramatic detail his daydream of overcoming his enemies and traducers and being elected Pope, presented his imaginings *as a novel.* In other words, Rolfe remained a novelist; he never came to believe that he was the Pope. Hubbard, however, goes farther. The slick craftsman of mass-production science-fiction, mustering his talents and energies for a supreme effort, produces — and what could be more reasonable? — a fictional science. Had dianetics been presented as fiction — as, let us say, the discovery revealed to our hero, Dick Savage, by the mysterious scientist, Dr. Vladimir Nemo, in the spring of 2013 A.D. in the Cosmic Ray Solarium of the fashionable Olympia Hotel in Lhasa, now a favorite summer resort for wealthy American poets and commissars — it might have been, like other ingenious science-fiction, good entertainment. It might even have stimulated scientific imagination, as no doubt *Twenty Thousand Leagues Under the Sea* stimulated the imaginations of naval architects and engineers.

But in the book *Dianetics,* Hubbard does not write as a novelist. He is, he says, a scientist. He has discovered — nay, created — a new science of the human mind which, in one swell foop, renders obsolete the psychological gropings of Wundt, James, Pavlov, Kraepelin, Charcot, Janet, Freud, Jung,

Adler, Lewin, Thorndike, Kohler, Moreno, Reik, Menninger, Masserman, Rogers, and all the work of the neuropsychologists to boot. Of this new 'science' of dianetics, Hubbard's book says (his italics), *'The hidden source of all psychosomatic ills and human aberration has been discovered and skills have been developed for their invariable cure.'* This sentence appears on the first page of the book, of which the opening sentence has been widely and derisively quoted by reviewers: 'The creation of dianetics is a milestone for Man comparable to his discovery of fire and superior to his inventions of the wheel and arch.' [2]

The expository technique of *Dianetics* is straight out of science-fiction. First, there is the elementary device of taking for granted the existence of things which do not exist, and then making assertions about them ('As we approached the planet Venus, Captain Wolf throttled down his space-ship to a leisurely 8,000 m.p.h.'): 'The reactive mind is the entire source of aberration. It can be proved and has been repeatedly proven that there is no other, for when that engram bank is discharged, all undesirable symptoms vanish and a man begins to operate on his optimum pattern' (p. 52). There are innumerable references to 'research' and 'tests' which 'have been' performed: 'A series of severely controlled dianetic experiments over a much longer period demonstrated that the law of affinity, as applicable to psycho-somatic illness, was more powerful than fear and antagonism by a very wide margin. So great is this margin that it could be compared as the strength of a steel girder to a straw' (p. 106). There are, of course, the vivid narratives (i.e., the 'case-histories') by means of which that which is *assumed* to be so is transmuted — and that is the function of the art of fiction — into that which is *felt* to be so. (Of these 'case-histories,' more later.) In addition, Hubbard has practically all the other science-fiction devices — references to unspecified 'laboratories' and 'clinics,' where zealous (and unnamed) teams of 'dianeticists' are busy refining the 'techniques' and the 'basic postulates.' Occasionally, he goes through the motions of distinguishing between 'fact' and 'theory' and abstemiously denying himself, as a scientist, the self-indulgence of proceeding on mere theories: 'It may well have been — and elsewhere some dianetic computations have been made about this — that the brain is the absorber for overcharges of power resulting from injury, the power itself being generated by the injured cells in the area of injury. That is theory and has no place here save to serve as an example. We are dealing now only with scientific fact' (pp. 53-54); 'As an organized body of scientific knowl-

[2] Hubbard has claimed that these are not his own words, but those of his publishers. They appear in an unsigned section headed 'Synopsis.' But both in style and content, the synopsis is indistinguishable from the rest of his book, which continues to the end to make similar claims in similar language. If it was not written by Hubbard, it was written by someone who was quite as awe-struck with Hubbard's genius as Hubbard himself. Whatever the authorship, it may be presumed that he had the opportunity, of which he did not avail himself, to remove the passage before publication.

edge dianetics can draw only the conclusions which it observes in the laboratory' (p. 105). In addition, of course, there is an occasional mathematical-*looking* equation or graph, extremely impressive except to those who can read them.

BUT THE SPECIAL and compelling feature of Hubbard's talent in science-fiction is vocabulary. If he had produced a genuine 'science of thought' he could hardly have chosen a better word than *dianetics,* an adaptation of an obsolete word *dianoetic,* found in *The Shorter Oxford English Dictionary* (where its earliest occurrence is given as 1677) and defined, as an adjective, as, 'of or pertaining to thought; intellectual,' and, as a noun, 'applied by Sir W. Hamilton to denote the operations of the discursive faculty 1836.' Nor could Hubbard have chosen a better word than the almost obsolete 'engram.' This word is defined by Masserman in his glossary of psychiatric terms as 'The supposed neural pathway or *trace* left in the nervous system by every sensorimotor experience' (*Principles of Dynamic Psychiatry,* p. 275). Hubbard redefines it for his special purposes as the 'cellular recording' on the 'reactive mind' which causes all mental disorders.[3]

In the main, however, Hubbard's vocabulary is his own invention; the invention is inspired by *some* acquaintance with the literature of cybernetics, that is, the theories underlying, among other things, the great modern electronic computers ('giant brains'). Modern computing machines can 'remember' and 'store' information (for example, on punched or magnetized tapes) and utilize past 'experience' in solving problems fed into them. They operate without error, given the information fed into them, working at fantastic speeds. But occasionally the electrical apparatus can be 'overloaded' or otherwise abused so that the machines become 'psychotic.' The startling discoveries of Norbert Wiener, Clyde Channon, Warren McCulloch, John von Neumann, and others in the mathematics and engineering of such 'thinking machines' have, with good reason, caused much speculation on the possible analogies between electronic computers and the human brain. The fact that startling analogies can be shown is beyond question; the fact that the pursuit of these analogies can contribute to our understanding of the human mind is also beyond question; but, at present, what remains little known or unknown is (1) what psychologically important results will emerge from the pursuit of this analogy, and (2) how far

[3] See Ogden and Richards: 'Thus when we strike a match, the movements we make and the sound of the scrape are present stimuli. But the excitation which results is different from what it would be had we never struck matches before. Past strikings have left, in our organization, engrams, residual traces, which help to determine what the mental processes will be. . . . An engram is the residual trace of an adaptation made by the organism to a stimulus' (*The Meaning of Meaning,* pp. 52-53). Ogden and Richards give as the source of the term, which has never had wide currency in psychological literature, Semon's *Die Mneme,* a work with which I am not familiar.

this analogy may legitimately be carried. The existence of such a scientific No Man's Land is exactly the condition under which the science-fiction writer (to say nothing of the scientist) is stimulated to his best work: dazzling new scientific miracles seem to be around the corner, while enough news of current developments has appeared in popular science literature to arouse public interest and curiosity.

THE SURFACE plausibility and the verbal ingenuity of dianetics are clear in the light of the foregoing. According to dianetics, which is an 'engineering' science (p. xxvi), the important part of the human mind is the 'analytical mind — or analyzer,' which is 'not just a *good* computer, it is a *perfect* computer,' which 'never makes a mistake' (p. 44) and 'computes perfectly on the data perceived and stored' (p. 16). Its memory is perfect, and all past experience is stored and filed in 'memory banks' (pp. 43-49, 53-55, et passim) and is perfectly utilized (p. 17). But like any other delicate electrical mechanism it has to be protected: 'Would you leave its delicate circuits prey to every overload or would you install a fuse system? . . . Any computer would be so safeguarded' (p. 53). 'Painful emotion and physical pain' are by definition the overloads on the circuit; these result by definition in the 'shutting off' of the 'analyzer,' which condition is, by definition, 'unconsciousness' (pp. 54-55). Unhappily, when the 'analyzer' is shut off, the 'reactive mind' takes over, recording all the painful emotions and physical pain in the form of 'engrams,' which are by definition the recordings, highly charged with pain, which, when 'keyed in' by 'restimulators,' cause 'demon circuits' (Book II, Chapter iv, et passim). These 'demon circuits' foul up the operation of the analyzer, causing 'aberration.'[4] Such aberrations are the cause of 'all neuroses, psychoses, insanities' (p. 53), and also (by definition) of *all* psychosomatic illnesses:

> Naturally such diseases, when one has resolved the problem of human aberration, become uniformly susceptible to cure. Arthritis, dermatitis, allergies, asthma, some coronary difficulties, eye trouble, bursitis, ulcers, sinusitis, etc. form a very small section of the psycho-somatic catalogue. . . . Just what, if any, part the virus plays in the common cold is not known, but it is known that when engrams about colds are lifted, no further colds appear. . . . A number of germ diseases are predisposed and perpetuated by engrams. Tuberculosis is one. . . . Many conditions which have been called 'inherited disabilities' are actually engramic. Engrams pre-

[4] The fact that computing machines can suffer 'nervous breakdowns' is well known: 'During World War II, [Dr. Shannon] says, one of the Manhattan dial exchanges (very similar to computers) was overloaded with work. It began to behave queerly, acting with an irrationality that disturbed the company. Flocks of engineers, sent to treat the patient, could find nothing organically wrong' (*Time*, January 23, 1950). See Norbert Wiener, *Cybernetics, or Control and Communication in the Animal and the Machine* (New York: John Wiley, 1948), especially Chapter V, 'Computing Machines and the Nervous System,' and Chapter VII, 'Cybernetics and Psychopathology.'

> dispose people to accidents. Engrams can predispose and perpetuate bacterial infections. . . . At the present time dianetic research is scheduled to include cancer and diabetes. There are a number of reasons to suppose that these may be engramic in cause, particularly malignant cancer (pp. 92-93).

How, then, is therapy accomplished? The aim must be, it logically follows, to 'discharge' the 'demon circuits.' This is accomplished by 'running them through' and 'erasing' them. (Recordings on tape and wire-recorders are, as the reader knows, 'erased' by 'run through.') It is necessary for the therapist or 'auditor,' and *anyone* can become an *expert* auditor (pp. 166, 167, 174 et passim), to send the patient back along the 'time-track' so that he may 'run through' the 'engramic' painful episodes of his past life stored in his 'reactive mind.' When these episodes are 'run through' several times, they are 'discharged' and go away to trouble the patient no more. Immediately, strength, eyesight, appetite are improved, allergies and backaches disappear, and the patient, no longer a patient but now a 'clear,' enjoys, for the first time in his life, perfect health and perfect mental functioning; his IQ shoots up 25 to 50 points, since his 'perfect computer,' i.e., his 'analytical mind' is no longer 'aberrated' (Book III, Chapter ii et passim).

A further indication of Hubbard's ingenuity and superficial acquaintance with contemporary thought is given in his appropriation of some terms from general semantics. The 'reactive mind,' as defined by Hubbard, thinks 'in a way which would make Korzybski swear, for it thinks in terms of full identification, which is to say *identities,* one thing *identical* to another' (p. 62); 'THE ANALYTICAL MIND COMPUTES IN DIFFERENCES. THE REACTIVE MIND COMPUTES IN IDENTITIES' (p. 336; author's emphasis). 'The reactive mind operates wholly on two-valued logic. Things are life or they are death, they are right or they are wrong, just as the engram wording states' (p. 241).

NONE OF THE FOREGOING requires refutation, of course. But all this computing-machine mumbo-jumbo is only a small part of the incredible nonsense to be found in dianetics. The stuff about producing 'clears' by discharging 'demon circuits' and reducing 'engrams,' etc., has at least the virtue of plausibility to those whose knowledge both of electronic computers and psychology is limited to what they read in the Sunday supplements.[5] But dianetics offers many more doctrines, not even dimly plausible, to be swallowed. Hence, my increasing sense of mystification as I read (for example, in *Look Magazine,*

[5] On rereading this sentence I find that it has a tone of intellectual arrogance which I am quick to disapprove in others. Let me hastily add therefore that there are a thousand topics about which I am equally limited in knowledge to what I read in the Sunday papers, for example, aeronautics, biochemistry, cowpunching, dendrology, entomology, fan-dancing, geriatrics, hermeneutics . . . .

December 5, 1950) of the amazing spread of dianetics, the huge sales of Hubbard's book, and the establishment of 'dianetic centers' in the principal large cities of the United States. Even more mystifying to me have been those people of good education and of some scientific background who have cautiously urged that dianetics be given a 'fair hearing' until 'more facts are in.' They have pointed out that there is evidence that dianetics 'works,' regardless of the implausibility of some of its theories, and that therefore, instead of dismissing it summarily, we should wait to separate the wheat from the chaff.

Before going into a discussion of the rest of the chaff in dianetics, let me state my position at once: there is no wheat.[6] Even if dianetic 'processing' produces, as Hubbard predicts, cures or apparent cures of neuroses, ulcers, falling hair, or diabetes, such results do not 'prove' a single item of dianetics doctrine. I do not say this in the spirit of the ecclesiastics who refused to look through Galileo's telescope, although I have no doubt such an accusation will be made. I say this on the basis of a simple distinction, familiar in general semantics literature, between *kinds of predictions*. If I predict that two cannonballs of different sizes dropped from a tower will hit the ground at the same time, my prediction *cannot be overheard by the cannonballs,* and hence cannot affect the outcome of the experiment. If, however, I hand you a mysterious bottle and predict that it will cure you of the loss of sexual vigor of which you have been complaining, *and you believe me,* you will drink the bottle and go to bed that night with changed expectations. *Your improved performance of that night will prove nothing about the efficacy of the contents of the bottle; it will merely prove something very sad about your capacity for belief — in other words, about your system of semantic reactions.* There is a world of difference between predictions which cannot affect the outcome, and predictions which are themselves a factor in producing the outcome.[7] Hence, the testimony of any number of individuals who, having been told they will be helped, later claim to have been helped by dianetic processing cannot constitute proof of

[6] This is a somewhat more absolutistic statement than is ordinarily approved in general semantics writing. Let me modify it by saying that there are some true statements in the book. But separating the truth from error in dianetics is like trying to get the vanilla extract back into the bottle after it has already been mixed into the cake batter. Hence I shall have to let my statement stand.

[7] Another way in which a prediction may affect the outcome is illustrated by the manager of a big-league baseball team nearing a pennant who remarked scornfully of a tail-end club with whom his team still had a few games left to play, 'Are they still in the league?' The remark was reported to the tail-end team, whose semantic reactions can be guessed; they decisively defeated the league leaders in the last few days of the season, depriving them of the pennant. On the subject of predictions affecting outcomes, see Anatol Rapoport, 'The Criterion of Predictability,' *ETC.* 2.129-151 (Spring 1945), and Robert K. Merton, 'The Self-Fulfilling Prophecy,' *Antioch Review,* 8.193-210 (Summer 1948).

the dianetics theory. Every therapeutic theory (psychiatric *or medical*) that has ever been believed in has worked to some degree, and sometimes to a spectacular degree (witness the rows of crutches at miracle-working shrines), *for the people who have believed in it.*

FROM HERE ON, let me concern myself with the rest of the chaff, which is so incredible that I shall not blame the reader if he refuses to believe that Hubbard, whom so many people have taken so seriously, ever said such things. The most important engrams, the 'basic-basic,' says Hubbard, are the result of prenatal experience. Evidently we all had a pretty rough time of it in the womb, and we are not to believe the Freudian publicity about what a nice place it was:

> . . . But life in the womb does not seem to be the Paradise it has been poetically, if not scientifically, represented. Actuality discloses that three men and a horse in a telephone booth would have but little less room than an unborn baby. The womb is wet, uncomfortable and unprotected.
>
> Mama sneezes, baby gets knocked 'unconscious.' Mama runs lightly and blithely into a table and baby gets its head stoved in. Mama has constipation and baby, in the anxious effort, gets squashed. Papa becomes passionate and baby has the sensation of being put into a running washing machine. Mama gets hysterical, baby gets an engram. Papa hits Mama, baby gets an engram. Junior bounces on Mama's lap, baby gets an engram. And so it goes (p. 130).

But that, according to Hubbard, is only the beginning of one's intrauterine misadventures. Mama, not content with knocking out the unborn baby by bumping into tables, repeated coitus, and falling over pigs (p. 242), usually doesn't want the child anyway, and is always trying to induce abortion (p. 132 et passim) by means of knitting needles (p. 156), by chemicals, by jumping off boxes, by having father sit on her (p. 300), and by 'assorted household instruments thrust into the cervix' (p. 242). Baby therefore gets punctured through and through, acquiring engrams every time, but he survives because of the puncture-proof inner-tube principle: 'Nature has been smart about attempted abortion for a long, long time' (pp. 242-3). And why does Mama continue to commit 'AA' (attempted abortion)? Because she is an 'aberree,' whose aberrations result from the fact that 'Grandma' was always trying to abort *her* (p. 243). Indeed, Hubbard finds 'AA' in the 'basic-basic' engrams of nearly all his patients. There are few people alive, then, who do not carry within them engrams of murder attempts committed against them by their mothers. Morning sickness is usually the result of mothers trying to abort themselves (p. 156). Sometimes fathers help mothers try to bring about abortion ('mutual AA'); the resulting engrams are, for technical reasons which need not be gone into here, especially complicated (p. 245). But these, like all other engrams, can be discharged 'with ease,' so powerful is dianetic therapy: 'The auditor can do everything back-

wards, upside down and utterly wrong and the patient will still be better, provided only that he does not try to use drugs before he has worked a few cases, that he does not use hypnotism as hypnotism and he does not try to cross dianetics with some older therapy' (p. 167).

IT MIGHT BE well to describe here in fuller detail Hubbard's account of the engram. The engram, even when acquired prenatally — and it can be acquired from the zygote stage on (pp. 130, 158) — has *verbal* content:

> Whether or not the unborn child is 'unanalytical' has no bearing on his susceptibility to engrams. The prenatal engram is just another engram. Only when the child is actually struck or hurt by a high-blood pressure or orgasms or other sources of injury does he become 'unconscious.' When he becomes 'unconscious' he receives all the percepts and words in the area of the mother as engrams. . . . Morning sickness, coughing, all monologuing (mother talking to herself), street noises, household noises, etc., are all communicated to the 'unconscious' child when he is injured. . . . And the child is very easily injured (pp. 155-156).
>
> . . . Any remark is aberrative in an engram. Even such a statement as 'You can remember this when in dianetic therapy,' made toward an unborn child, installs an engram so that every word in this statement means a physical pain just where he received it at the time. . . . If the doctor is very tough and says, 'You had better take good care of yourself, Mrs. Jones. If you don't you'll be mighty sick!' the child, 'unconscious' from the examination no matter how mild it is, will get a mild hypochondria when the engram keys-in and be very concerned over his health.
>
> If the husband uses language during coitus, every word of it is going to be engramic (p. 157).

Now, the engram as such, it is argued, 'is not a sentient recording containing meanings. It is merely a series of impressions such as a needle might make on wax' (p. 131). Hubbard is carefully unspecific as to how this recording is made:

> The child before birth does not depend upon the standard senses for its perceptions. Engrams are not memories but cellular level recordings. Therefore, the child needs no eardrums to record an engram. Cases are on hand where whatever hearing mechanism the unborn child had must have been temporarily destroyed by an abortion attempt. And the engram was still recorded. The cells rebuilt the apparatus which was to be the source of sound in the standard banks and stored their own data in the reactive bank (p. 158).

These 'cellular level recordings' do not do much damage by themselves. But later in life, the recurrence of a part of the cluster of recorded impressions including words can 'restimulate' and 'key-in' the engram:

> Put a man under ether, hurt him in the chest. He has received an engram because his analytical power was turned off first by ether and

> then by a chest pain. While he was there on the operating table, the reactive mind recorded the click of instruments, everything said, all sounds and smells. Let us suppose that a nurse was holding one of his feet because he was kicking. This is a complete engram.
>
> The engram will be keyed-in by something in the future, a similar incident. After this, in greater or lesser degree, whenever he hears clicks like instrument clicks he gets nervous . . . he may find that his foot feels slightly as if it were being held . . . the chest pain would be found present in some degree. . . . This is 'push-button' in its precision (p. 74).

This push-button mechanism theory, obviously derived in part from the Korzybskian idea of 'signal reaction,' is central to both the plausibility and the appeal of dianetics. In our environment there are innumerable 'push-buttons' — words, smells, sounds, sights — which, although of no special significance to our 'analytical minds,' are meaningful to the 'reactive mind.' If we have recurrent failures of self-control, feelings of uneasiness, backaches or migraines, homosexual tendencies, or whatever, it is because some of the stimuli around us act as push-buttons 'restimulating' unhappy and painful 'engrams,' which are *by definition* something we are *not responsible for,* since they were acquired during states of 'unconsciousness.' The job is to identify the words and other stimuli which act as 'restimulators,' and then to recover, by reverie, the 'engrams.' The engrams are then 'run through' and 'discharged' of their affective content. When this is done, we are freed of all our burdens; we emerge as supermen.

HUBBARD'S BOOK, especially his 'case-histories,' is so rich in absurdity, so preposterously and awkwardly obscene (especially in the accounts of engrams acquired during parental coition), that one is tempted to quote on and on. I shall content myself by giving two more instances before completing my account of his theories. One fascinating notion is that, since human memory is by definition perfect, one is able, in dianetic reverie, to go back to conception *or before!* How dianetic science struggled through to this conclusion is explained thus:

> After a few cases had been examined . . . dianetics was forced to accept . . . the fact that the cells of the foetus record. A few more cases and a little more experience discovered that the embryo cells record. And suddenly it was discovered that recording begins in the cells [sic] of the zygote — which is to say, with conception. . .[T]he body recalls conception. . . . Most patients sooner or later startle themselves by finding themselves swimming up a channel or waiting to be connected with. The recording is there (p. 130).

Other passages indicate the degree to which Hubbard has prepared for all contingencies an auditor may run up against. What, for example, of the child of immigrant parents or the adopted child whose prenatal engrams are re-

corded in a language other than that which he uses as an adult? Special instructions for this kind of case involving the use of dictionaries are provided on pp. 315-316. More complex are the 'Junior cases,' i.e., sons who are named after their fathers. The complexity results from the fact that mothers — most mothers, apparently — are unfaithful to their husbands. In the course of intimacies with their lovers, they may (and do) make unfavorable remarks about their husbands. The lovers too may make remarks. If mother happens to be pregnant at the time, Ralph, Jr. is getting loaded up with engramic recordings about 'Ralph' — i.e., Ralph, Sr. Since the reactive mind is given to identification reactions (Ralph is Ralph) everything said about Ralph, Sr. is interpreted by Ralph, Jr. as applying to himself. Obviously, the consequences are appalling. Hubbard advises prospective dianeticians, 'Do not take on a Junior as your first case if you can avoid it. . . . It is customary to shudder, in dianetics, at the thought of taking on a Junior case' (p .305). Such cases also offer special difficulties of 'sonic [auditory] recall', since the lover is likely to have said, during or immediately after coitus, 'Ralph must never hear of this' (pp. 209-210).[8]

A BASIC question remains. Why, in the light of the foregoing, has dianetics had *any* following? Why was its preposterousness not evident at once to everyone to whom it was presented, including the publishers? The attempt to answer this question is the sole justification I can offer for directing the reader's attention for so long to a topic so intellectually and scientifically negligible.

A first and obvious answer to his question is that thousands of people today are looking for help in emotional problem-solving, and dianetics purports to offer a technique for self-help. Hubbard directs the reader not to go to expensive analysts and psychiatrists, whose methods are out-of-date anyway; instead, husbands and wives, friends and neighbors, dormitory room-mates, can band together and help themselves. This appeal to economic self-interest, however, is not sufficient in itself to explain its sudden spread. There is something more.

This something more has already been suggested. It is the unusually successful use of mechanical analogies. We are habituated to the use of metaphorical vocabularies, mostly non-electrical in origin but now predominantly employed with electrical connotations, to describe everyday occurrences: 'Tom *relayed* the information,' 'Dick *sparked* the sales drive,' 'Harry *blew a fuse.*' Even the most casual newspaper reader has heard of 'brain waves' and 'electroencephalograms.' Hubbard's technical jargon is marvellously suggestive at once of both electrical and psychological phenomena, which, although no doubt ultimately related, are certainly not related in the way he describes.

[8] Hubbard's hatred and contempt of women is quite intense. His 'case-histories' betray a remarkable obsession with 'AA' and female adultery.

The fact that language can be used to adumbrate two (or more) areas of meaning at once is not in itself dangerous; indeed, it is this fact which gives language its richness and its power of creative suggestion. In Norbert Wiener's *Cybernetics,* the simultaneously electrical and psychological connotations of terms is peculiarly stimulating to the imagination. (It will be remembered that this book, too, enjoyed sales far beyond initial expectations.) But in *Cybernetics* the double-edged vocabulary is used with full consciousness of abstracting; in other words, Wiener never forgets — nor lets the reader forget — that the analogy is an analogy and that the genera to which Mark III and Mark Antony belong are distinct and separate.

Professor Weller Embler, in his article 'Metaphor and Social Belief' (*ETC.* 8.83-93, Winter 1951), has ably described, with a footnote reference to dianetics as an example, the kind of semantic reaction induced by 'perfect' metaphors. The metaphorical character of a statement may not be apprehended at all, so that we are likely, under favorable conditions, to feel that 'The city *is* a jungle,' 'Nature *is* a teacher,' 'The subways *are* the city's arteries.' Each age, says Embler, has its characteristic metaphors; those of other ages ('The soul is a garden, the will the gardener') are clearly seen to be metaphors. But, 'When metaphor is new, and when the reader does not enjoy the perspective vouchsafed by time, the metaphor is taken literally, and its function is not that of a rhetorical device, but of statement of fact, *prescribing* certain kinds of behavior.' Embler mentions, in addition to men-and-machines metaphors, those comparing human fate to probability phenomena as another kind which strikes us today as being vividly 'true':

> Fortune, in its workings, has something in common with a slot-machine. There are those who can bait it forever and never get more than an odd assortment of lemons for their pains; but once in a while there will come a man for whom all the grooves will line up, and when that happens there's no end to the showering down. (Dorothy Baker, *Young Man with a Horn.*)

It is to be noted that Hubbard is not so flat-footed as to introduce in so many words the assertion 'The mind is a computing machine.' Indeed, such an assertion would have only had the effect of causing the reader to wonder about the degree to which this might be true. He introduces the analogy explicitly as an analogy, but he hastens to state that the analogy has shortcomings only because the mind is a *better* machine (p. 43). The effectiveness of this statement, in its context, lies in the fact that it is, in *some* respects, true. Nevertheless, the unique abilities of the human brain, such as the ability to invent computing machines, are of a different *order* than those of the machines. No computing machine has so far invented so much as a pocket abacus. If this difference of *order* is ignored — and most people ignore it — the notion that the mind is a better and much more elaborate machine can sound compellingly

'true.' [9] From this point on, to quote Wendell Johnson again, 'the language does your thinking for you.' *Hubbard does not have to convince the reader who lets the metaphor slip under his guard; the reader convinces himself.*

NO SPECIAL perfidy need be attributed to Mr. Hubbard, and no special degree of gullibility need be attributed to his followers, in attempting to account for the spread of dianetics. Hubbard, his followers, *and Norbert Wiener* (to say nothing of the mathematical biologists!) are alike products of the linguistic and semantic environment; they are alike in pursuit of the fruitful implications of the characteristic metaphors of our times. The difference between the humbuggery of dianetics and the rich scientific and humanistic [10] promise of cybernetics is a measure of the difference between linguistic naiveté and full semantic awareness. I know of no contrast in recent literature which shows more vividly or dramatically the importance of what Korzybski called 'consciousness of abstracting' — the disastrous results when it is absent, and the rich consequences when it is there.

It is possible to abstract, from Embler's account of the prevailing metaphors of our time and from the success of dianetics, a dismal picture of the climate of popular opinion. Life is a slot-machine. No virtues of intellect or character which we may perfect through study or self-discipline can increase our chances of reward. But, fortunately, we are perfect computing machines, temporarily in poor repair, to be sure, because of stuck keys, demon circuits. Unstick the keys and discharge the circuits, and boy, will we begin to click! Because we shall be able to think perfectly, life will lose its probabilistic character. We shall have perfect prediction and control. Then, there will be 'no end to the showering down.'

I AM AWARE that my earlier dismissal, in terms of kinds of predictions, of the claim that dianetics 'works' has not been completely satisfactory, since it does not take into account the differences between dianetic and other therapies. I should therefore like finally to take account of one other factor in the 'working.'

Emotional disturbances are of course failures in interpersonal relations. It is by now commonplace to observe that any radical change in the situation in which communications between people take place can radically alter the relations between them and the content of the communications. Dr. Trigant Burrow, changing seats with his patient in a psychiatric interview, was so affected by the changes he felt in his own professional self-assurance that he

[9] Regarding 'order,' see A. Korzybski, *Science and Sanity* (3rd ed., Lakeville, Conn. 1948), 429ff.; also A. Rapoport, *Science and the Goals of Man* (New York: Harper, 1950), 236-243.

[10] See Wiener's *The Human Use of Human Beings* (Boston: Houghton Mifflin, 1950).

eventually found himself compelled to reorganize his entire view of psychiatry.[11] Students of group dynamics have made intensive investigations into these often startling results of what they have termed 'social restructuring.'

It is apparent that if a man and wife read the dianetics book and are persuaded to 'try it,' the effects can be those of social restructuring — indeed, of what is called in group dynamics 'role-playing.' The husband no longer listens to his wife in his everyday role of husband. He no longer shapes in his mind, as he waits for an opportunity to break in, the cutting and unassailable retort. He is now an 'auditor.' His attitude to his wife's remarks is, then, no longer defensive, but 'therapeutic' — i.e., attentive, 'non-judgmental,' and 'permissive.' The same will be true for the wife when it is her turn to 'audit.' As a result of such role-playing and in spite of all the dianetic nonsense, communications *may* be established on a number of topics about which there had been misunderstandings and harmful projections.[12] With the alleviation of the misunderstandings and the dismissal of suspicions now seen to have been unwarranted, there may arise warmth and pleasure — the sense of having emerged from under a cloud. Headaches and fatigue may also be relieved, and possibly more serious ailments — this is a point that need hardly be argued in the light of present knowledge of psychosomatic mechanisms. The appalling thing revealed by dianetics about our culture is that it takes a 452-page book full of balderdash to get some people to sit down and seriously listen to each other!

BUT EVEN the limited good that dianetics may do by introducing a single, narrowly-defined role-playing technique into interpersonal relations is probably more than offset by the damage it can do with its accompanying pretentious and nonsensical doctrines. I am not thinking here of the standard medical argument, that it may keep people away from better and more legitimate therapies, although this is no doubt true. (So many things keep people away from legitimate therapies anyway that I am not sure that one more patent-medicine can matter much.) I am thinking rather of the fact that those who are helped by dianetics will necessarily be kept at a low level of intellectual and emotional maturity by the nonsense they have absorbed in order to be helped. The lure of the pseudoscientific vocabulary and promises of dianetics cannot but condemn thousands who are beginning to emerge from scientific illiteracy to a continuation of their susceptibility to word-magic and semantic hash.

S. I. HAYAKAWA

[11] He tells the story in the Preface to *The Social Basis of Consciousness* (New York: Harcourt, Brace, 1927).

[12] Perhaps I should add here that I have never attended a dianetic session, although I have had people tell me of their experiences in auditing each other. Since I have never observed any kind of psychotherapy session, except for watching on one occasion the administration of metrazol, I have not felt myself a competent enough observer to evaluate the proceedings.

To Each His or Her Own

MALE AND FEMALE, by Margaret Mead. New York: William Morrow and Company, 1949. 477 pp. $5.

TO USE sex differences towards making a better world is the big idea advanced by Margaret Mead in *Male and Female*. She believes that there are kinds of work and recreation as well as different rhythms of activity which are better suited to one sex than the other. If civilization, and, more specifically, our American culture, is to reach any higher level it should utilize more fully its raw materials. The raw materials of civilization are human beings — men and women, male and female children.

Dr. Mead arrives at this belief through her admirably painstaking observations and anthropological study of cultures. She has not relied on any existing folklore about 'feminine intuition' but has pinned her faith on the scientific method of her profession. It is part of her purpose in writing the book to give the reader an understanding of the method.

> I do not want merely to document vividly that different peoples can cast males and females now for one role, now for another, nor merely to show that the casting fits together very neatly, as between childhood training and adult behavior. I want somehow to give to the reader the positive findings from a comparative study of culture about similarities, about the essentials in maleness and femaleness with which every society must reckon, and regularities as well as differences. I want to give results and yet keep the sense of how these findings have been arrived at.
>
> . . . . anthropologists learn, by doing fieldwork, to think of many things together that most students of human behaviour are not accustomed to thinking of together. This way of thinking, which refers a whole series of apparently disparate acts — the way a child is fed, a house-post carved, a prayer recited, a poem composed, or a deer stalked — to one whole, which is the way of life of a people, this is a habit of mind that we carry over into work we do in our own cultures too.
>
> . . . . the anthropological approach is to go out into primitive societies without any too specific theories and ask instead open-ended exploratory questions. How do male babies and female babies learn their social roles in different societies? What types of behaviour have some societies classified as male, what as female? What behaviours have they failed to treat as sex-typed? How alike have some societies felt males and females to be — and how unlike?
>
> . . . . The thousand and one statements that are made every day — 'Isn't that just like a man?' 'Men are just big children.' 'Women have such childlike minds.' 'Women are more sensitive than men.' 'Men are more sensitive than women.' 'Women are more variable than men.' 'Men are more variable than women' — have to be swept from the mind like tattered autumn leaves from the garden-paths before it is possible to think clearly at all.

THE BOOK is divided into four sections. The first explains the author's approach. Two sections are given to 'The Ways of the Body' and 'The Problems of Society.' These are developed with material from Mead's studies of Pacific peoples and richly illustrate the formation of cultures by human needs and the shaping of personality by the existing culture. It is apparent that ideas of masculinity and femininity are powerfully conditioned by society. It is equally evident that certain societies, in delineating sex roles, allow for more happiness and more satisfaction of human needs and aspirations than do others.

The final section is named 'The Two Sexes in Contemporary America.' Mead defines two constants in our varied culture. One is — difference. No two American homes are exactly alike and therefore the practices, habits, attitudes and speech of individuals are all different and liable to misinterpretation by each other.

> The hand held out in greeting, to still a tear, or to help up a strange child that has stumbled, is not sure that it will be taken, or if taken, taken in the sense in which it is offered. Where patterns of courtship are clear, a girl knows the outcome if she smiles, or laughs, casts down her eyes, or merely walks softly by a group of harvesting youths cradling a red ear of corn in her arms. But in America, the same smile may evoke a casual answering grin, embarrassed averted eyes, an unwelcome advance, or may even mean being followed home along a deserted street, not because each boy who answers feels differently about the girl, but because each understands differently the cue that she gives.

The other constant is that American families are oriented towards the future; the present is an imperfect version of an idealized future rather than a cherished repetition of an honored past. The discrepancy is felt as a discrepancy between self and others and also between what one should be and feel and what one is and does feel.

There is a consequent striving for achievement which can never be satisfied since the goal is not fixed but is continual advancement in a chosen field. The field itself is not of importance. It is advancement within that field, competition with others in the same kind of work. Men and women in America are in competition for similar business and professional advantages. Boys and girls in school and at home compete in the same kinds of endeavor. Consequently those gifts particular to one sex or the other are lost to the society.

> Once it is possible to say it is as important to take women's gifts and make them available to both men and women, in transmittable form, as it was to take men's gifts and make the civilization built upon them available to both men and women, we shall have enriched our society. And we shall be ready to synthesize both kinds of gifts in the sciences, which are now sadly lop-sided with their far greater knowledge of how to destroy than of how to construct, far better equipped to analyze the world of matter into which man can project his intelligence than the world of

> human relations, which requires the socialized use of intuition. The mother who must learn that the infant who was but an hour ago a part of her body is now a different individual, with its own hungers and its own needs, and that if she listens to her own body to interpret the child, the child will die, is schooled in an irreplaceable school. As she learns to attend to that different individual, she develops a special way of thinking and feeling about human beings. We can leave these special learnings at the present level, or convert them into a more elaborate part of our civilization. Already the men and women who are working together in the human sciences are finding the greatly increased understanding that comes from the way in which their insights complement each other. We are learning that we pay different prices for our insights: for instance, to understand the way a culture socializes children a man must return in imagination to childhood, but a woman has also another and different path, to learn to understand the mothers of these children. Yet both are necessary, and the skill of one sex gives only a partial answer. We can build a whole society only by using both the gifts special to each sex and those shared by both sexes — by using the gifts of the whole of humanity.

FOR STUDENTS of child development the author draws pictures of how a mother influences personality development in infancy. That she does we know, principally from psychoanalytical case histories. But Mead describes the difference in the way a mother offers her breast to a male or female child — how she encourages awareness and acceptance of sex by her different touch and handling of boys' and girls' bodies. To some minds these objective observations of behavior satisfy a felt need for supplementation of psychoanalytical data which are necessarily incompletely and imperfectly remembered.

In a broader way she speaks to everyone who senses his membership in a human society. Members of a human society enjoy the uniquely human trait of consciousness of self. They have the ability and privilege of studying themselves, their ways of doing, their culture, and of deliberately bringing about improvements in those ways. Human beings can then build their civilization self-consciously which is a different process from repetition or simple chance. Anatol Rapoport described such a self-conscious society as a 'culture-studying culture' and recognized 'that a culture that can emerge from the study of other cultures is by no means the same as a plain, hand-me-down culture in which one simply continues to do what one's neighbors and forebears have always done. A culture$_1$-studying culture$_2$ is of a different order and cannot be placed on the same level with the existing cultures$_1$.'[1] It is on the basis of such a belief in the culture-studying process that *Male and Female* is built.

KATHERINE HYAMS

Honolulu, T. H.

[1]Anatol Rapoport, *Science and the Goals of Man* (New York: Harper, 1950).

For Better and Better Reading

S. R. A. BETTER READING BOOK 2, by Elizabeth A. Simpson. Chicago: Science Research Associates, 1950. (With 'S. R. A. Reading Progress Folder' and Instructor's Guide.')

THIS IS one of those exercise books that purport to improve reading by giving the student machinery with which to test his speed, test his comprehension, keep track of his rate of progress, etc.

One of the exercise selections is a condensed 1800-word excerpt entitled 'The Night the Bed Fell' from James Thurber's *My Life and Hard Times.* In spite of condensation, the excerpt retains Thurber's wonderful sense of the preposterous; the deadpan seriousness with which he describes confusion and embarrassment (including his own) is one of the major comic triumphs of our time. After reading the selection, I turned the page and gave myself the comprehension exam, which consisted entirely of multiple-choice questions of the following kind:

6. During the night Briggs usually woke up every hour
   (A) by having someone shake him
   (B) by having someone turn on the light
   (C) by setting the alarm clock, etc.

20. On the night the bed fell, the only bed that really crashed was
   (A) Thurber's
   (B) Mother's
   (C) Father's, etc.

I believe I got the right answers to 17 of the 20 questions.

But what worries me is this. Suppose a student reads the passage at the maximum speed desired; suppose furthermore that he gets 20 of the 20 questions right; then, suppose he doesn't find a damn thing to laugh at in the whole selection. What does the teacher of reading do then?

S. I. H.

Group Dynamics in Action

TRAINING IN COMMUNITY RELATIONS, by Ronald Lippitt. New York: Harper & Brothers, Publishers, 1949. 283 pp. $3.50.

THIS IS the second in a series of books published by the Research Center for Group Dynamics, of which Ronald Lippitt is a program director.

Group dynamics studies groups and the way they get along, much as psychiatry and clinical psychology study the individual. The first book published by the Center was *Resolving Social Conflicts,* by the late Kurt Lewin, founder. In

that book Lewin discussed conflicts in marriage, industry, and race relations, and described techniques for easing tension when it arises.

In the present book, Lippitt tells of an attempt to train men in the use of these techniques. Written in an intimate, informal style which often makes the reader feel that he is participating in the training program, the book is a valuable report on the latest developments in this area of finding more satisfactory methods of dealing with intergroup conflict than tanks and bombs, riots and strikes.

THE TRAINING program, a two-week, full-time workshop, grew out of an inquiry by a Connecticut group who had been active in improving relations between various racial, ethnic, and religious groups. This group of four men, representing various Connecticut committees, asked

> if scientists could shed any light on this problem of on-the-job training of community leaders to tackle more effectively the complex problems of working out better intergroup relationships.

The first intergroup relationship which had to be worked out by the Connecticut group and the Center was between their own two groups. One wanted primarily to get efficient community leaders trained as rapidly and as inexpensively as possible; the other was especially interested in having an experimental design incorporated into the workshop, so that they could test various hunches about how effective the training program would be.

This conflict between social scientists and social practitioners illustrates a fundamental principle of the workshop, namely, that the trainees (volunteer and professional social workers and teachers) actually experience interpersonal conflict and methods of resolving it during their training, rather than merely discuss 'intergroup relationships' at a high-abstraction level. Almost a third of the case material studied consisted of the interpersonal relations which developed at the workshop. One result of the opportunity to discuss their own group tensions was that *these tensions produced progress rather than disruption.* (An operational definition of psychotherapy?)

The training program began with the staff acting out an imaginary workshop meeting. The trainees, as the audience, were shown by this dramatic skit that 'leadership is a function of the team as a team,' and that the discussion leader is there, not to impose his ideas on the group, but 'to listen intelligently and to push for clarification and understanding of what the various contributors mean.'

The first problem tackled by the trainees was to decide just what aspects of group relations they wished to study during the workshop. This had not been planned out ahead of time, because the staff felt that, 'The major necessity was to get group definition and group acceptance of the chief problems to be tackled.

This could come only from an explicit, face-to-face sharing of problems and ideas for curriculum priority.'

After the problems which the trainees wished to discuss were listed and arranged in a meaningful order, further insight into the nature of the problems was sought. One way of getting this insight was to call in experts from various fields, *not to supply solutions to problems,* but to clarify just what the nature of the problem was.

Additional insight was also gained by having the trainees enact relevant situations. For example: A Negro and a white trainee would each play a member of his own racial group in some common situation, in order to give the group of trainees the opportunity to experience the situation. The two men acting out the roles would speak in 'asides' to the audience and express what they felt and thought, so that the group was given insight into what things are *not* communicated when tension exists. Then, the two trainees would exchange roles, and go through the skit again, so that each got some feel of how the situation was experienced by the other.

Finally, the trainees planned specific steps of back-home action in their respective communities. They then reviewed the procedures they had used in handling the problem under discussion in order to see how they could do a better job with the next problem.

THREE chapters of the book describe the use of the workshop as a laboratory for the study of human behavior. The social scientists wanted to know what the trainees had been like as community leaders before coming to the workshop; what experiences they had had at the workshop, that is, what kinds of activities had gone on, and how much of the total time was given to each type of activity; finally, what the trainees were like as community leaders after undergoing this brief but intensive training.

Lippitt reports that half of the workshop program was devoted to developing skills in interpersonal situations, while only 5% was on 'influencing attitudes and action through the use of the mass media (radio, press, etc.).' This matches the kind of training which the trainees had said they wanted, before the workshop began. They had emphasized that they felt a need for training in 'skill in handling face-to-face situations.' Co-workers of the trainees in their home communities who did not participate in the workshop also recommended training in 'the ability to meet and work with people tactfully.'

Did the program work? Did the trainees acquire the skills they felt in need of and which they had practiced during the two-week workshop?

In order to determine if the trainees had actually developed additional permanent skills in dealing with people, the research team interviewed them and their co-workers both before and after the workshop. Six months after the training program had ended, two-thirds of the trainees reported that they had

observed changes in their style of working with people, and half of this group reported an 'increased sensitivity and consideration for feelings of others.'

This is one of the major results one would hope to attain from months of individual psychotherapy. That it was produced after a two-week workshop attests to the clinical soundness of the techniques used. This is not the only evidence, however, that in many respects *the workshop was an experience in group psychotherapy*. Lippitt states that from the beginning the staff felt

> the obligation to think carefully, just as therapists do, about the nature and sequence of their personal relationships to the trainee groups and individuals. In order to work at all effectively in such a short period of time, it is necessary to win acceptance and establish close emotional relationships to the group quite rapidly.

Toward this end, procedures were 'worked out for creating an informal, permissive social situation.'

This technique of using clinical principles while dealing with groups is an extremely effective process for changing attitudes and behavior. It will be even more effective when clinical psychology and group dynamics are in closer collaboration. The present lack of collaboration is reflected, for example, in the dichotomy of relations-between-groups and relations-between-individuals, and in the absence of any attempt to measure personality changes occurring along with changes in behavior and attitudes.

Lippitt's book is a step towards getting the two groups together. This is important, for group dynamics is a powerful tool for peace: individual peace of mind, marital peace, industrial peace, perhaps even international peace. May it be in time!

AL EGLASH

University of Michigan, Ann Arbor, Michigan

To grasp the meaning of the world today we use a language created to express the world of yesterday. The life of the past seems to us nearer our true natures, but only for the reason that it is nearer our language. ANTOINE DE SAINT-EXUPERY, *Wind, Sand and Stars*.

☆ CORRESPONDENCE ☆

The Coding is the 'Thinking'

SIRS: Dr. Kessler's article concerning 'The Great Bookies' (*ETC.* 7.217-221, Spring 1950) offers a type of presentation which other contributors could well afford to emulate. Down-to-earth discussions of this type, especially on topics intimately connected with affective behavior, probably accomplish far more in locating and correcting misevaluations than do most scholarly discussions. . . . Reactions to Dr. Kessler's article probably will prove this contention, since he has no doubt needled a number of well-meaning folks in a vulnerable spot.

As 'an international quarterly of discussion, research, and theoretical inquiry,' *ETC.* seems, somewhat ironically, to emphasize the theory rather than the practice of general semantics. Though pure research is ever requisite to the continued development of a science, the 'proof of the pudding' remains in the eating. The theory does not become really effective in changing social behavior until it has been placed in the hands of the man-on-the-street, whether it be in the form of a horseless carriage, or a world-wide fear neurosis of the hydrogen bomb. From this standpoint, the Society might well consider the publication of a supplementary journal devoted primarily to applied general semantics. Under such a dual system of publication, *ETC.* would no longer need to cater to both God and Mammon. Theoretical research could be intensified, and papers could be published which at present might be rejected on the sheer basis of gravity.

In this connection it is perhaps significant to note that *ETC.* has published only a modicum of research concerned with the mathematical basis of semantics. Of all unpopular subjects, mathematics is perhaps lowest on the totem pole, and, consequently, is the surest way to lose friends and alienate people. The fact remains, however, that the sea of mathematics is never at rest, and that a revolutionary development in mathematics can hardly fail to make itself felt in the semantic plenum. Unless general semantics develops along the fluid and dynamic lines of living mathematics, it is doomed eventually to stagnate. Though it is difficult to predict what trends such development might take, a few are more or less self-evident.

Korzybski recognized the theory of numbers as one of the fields of mathematical inquiry most pregnant with possibilities. As he pointed out, number theory has not yet enjoyed its millennium, and probably will not, until its direct connection with the human nervous system has been established. Cybernetics, which emphasizes the analogy between the electronic computer and the human brain, has so far been content with a binary number system as a suitable analogue

of aristotelian logic, and of the 'open' and 'closed' states of an electric circuit as suitable analogues of the 'all' or 'none' reactions of human nerve cells. Topologically, as a generalization of the Moebius strip (see *American Mathematical Monthly,* May 1948, pp. 308-9), it is possible to show that these properties exist for the whole class of prime numbers, of which the number two is only a special case. The neurological basis of prime and composite numbers, therefore, may be of very real concern to the general semanticist. The difference between these two classes of numbers is actually independent of the system of numeration, and may hence be more basic.

Popular accounts would lead us to believe that mathematicians are divided into two factions as to whether computing machines do or do not 'think.' According to an old saw, 'A problem clearly stated is half solved.' Perhaps, using the words in a more pregnant sense, a problem *clearly* stated is *already* solved. Any problem put to a mechanical computer must be properly coded if the machine is to turn out the answer. Perhaps this process of 'coding,' which requires human intervention, and which ultimately is a process of stating the problem properly, more nearly constitutes the actual 'thinking' process than does the 'calculating' process. This, of course, is only another way of saying that the map is not the territory mapped, the semantic statement *par excellence.* The mechanism of how the brain 'codes' a problem before feeding it into the computing section is consequently a problem which cybernetics evades by the simple expedient associated with the ostrich, yet it is one which is of paramount interest to the semanticist.

Folks were saying 'I reckon as how,' and 'The way I figure' long before Wiener pointed out the analogical relationship between computers and human nervous systems. Philosophers were discussing what they often referred to as 'knotty problems' long before Kurt Lewin recognized the applicability of topological manifolds to the human process of thought. Is it possible that the rash of 'new sciences' which has broken out as a result of the concentrated attention upon analogy and metaphor (and, unfortunately, puns) is only a natural outgrowth of unconsciously coded evaluations which have become an integral part of our structure of language through evolution and time-binding? Considerable mathematical theory has grown out of the study, *per se,* of the relations existing among numbers, culminating in the analytical theory of numbers, even though the science started as numerology. Is there an analogous analytical theory of words, related to etymology but more basic, which will reveal to us the inherent structure of sciences yet to come? Just as astrology preceded astronomy, we may need to outgrow the methods of the medieval alchemist, before we can arrive at a chemistry of words.

The theory of types, and the structural differential, tend to show that there is no general rule, except that there is no general rule. How comes it, then, that

no one has generalized the structural differential, which at most is only one of an infinite number of possible models for the process of infinite levels of abstraction? Topology abounds with formulations, such as simplexes, which might serve equally well if not much better, as a model for this human characteristic, with the added advantage of portraying the *n*-dimensional nature of syllogistic reasoning, culminating, as *n* approaches infinity, in statistical logic.

Let us then be up and doing, lest we fall into the same fate as did the Pythagoreans, who spoke of themselves in hushed tones, or of the medieval schoolmen, who were convinced that Aristotle could do no wrong.

H. T. McAdams

Bethalto, Illinois

Semantics and the Actor

Sirs: Most actors consider themselves artists; as such they too readily fall into a way of dichotomizing their thoughts: namely, 'art' as opposed to 'science.' Hence, many of them don't pay much attention to applying methods of science in their thinking. Probably even fewer of them stop to think about the words they use in discussing and preparing their work. Consequently, we find that certain words become overworked. What is more, these words tend to lose their meaning, to become clichés in a kind of actors' lingo. They have such strong connotations that they mislead and confuse the actor rather than help him to understand his work and his fellow actors.

We don't want to make the art of acting conform to scientific rules; but we can make the wheels move a lot more freely if, as actors, we improve our knowledge of how and when to rely on words. Actors, like others, have their problems of communication — probably they have even more problems than others because they deal with make-believe as well as with fact.

What are some of these booby-trap-laden expressions that actors use? What are some of the words? Any actor can name a number of them: emotion, emoting, true ditto; feeling, true feeling; getting into the mood; pear-shaped vowels; you've got it right, now, so don't change it; emotional *vs.* intellectual acting; feeling *vs.* representing the part; living the part *vs.* representing emotions; character part, character actor; he didn't act, he *was* Hamlet; project your lines; style of production; tempo; rhythm.

For instance, an actor may be faced with what he thinks is an 'emotional' scene. The word conjures up mental pictures of vocal hysterics, tears streaming down a sob-twisted face. These things may or may not be called for in the scene to be played. What we are concerned with is the possibility that the actor may be tempted to grab at these verbal connotations and make use of them to put together some kind of a performance. In doing so he may completely neglect the kind of life that is mapped out for him by the author of the play.

For a positive rather than a negative example: in the film *Emile Zola,* Joseph Schildkraut, in the character of Dreyfuss, has to play a scene in which he is finally released from his cell after years of imprisonment. Mr. Schildkraut evidently gave 'emotion' the go-by, and with splendid results. He let himself way down on the abstraction ladder, far below 'emotion,' to the actual extensional processes and stimuli affecting a man under long imprisonment, who had been manacled to his bed of boards and had never passed outside his cell door since his entry years before. The result? No sobbing, no stage tears or pumped-up 'emotions.' Instead we saw a man gradually accustoming himself to the experience of normal living, after years during which abnormal living had come to be normal to him. We saw Mr. Schildkraut helped to his feet, dealing with a stiffness in his limbs; we saw him moving with a sense of space-relationship that had been subjected to a distortion of the same kind as that felt by a man whose limbs are really confined by chains. And the final touch: as he finally makes his way to the door that has been opened for him and goes out of it for the first time since he came in — this is too much for him. He looks at the opened cell door, looks back inside, and in the next few moments he enters and leaves his cell a number of times. The experience is such a strange one for him in his condition that he cannot accustom himself to it the first time — he cannot assimilate the novelty of the experience at once, so he repeats it again and again, going over its little details for himself each time. This depiction of his exploring freedom, and almost rejecting it, was profoundly moving.

The kind of an 'emotion' produced by this scene is far different from that produced by the reacting to connotations at the symbol level. Actors who work in the way illustrated are not being 'coldly intellectual.' On the contrary, they (and subsequently their audiences) are much more likely to be carried away by what they are doing because they are becoming involved with the fabric of the *extensional experience* that *produces* the emotion.

ALL THIS would seem to lead right into controversies such as 'true' versus 'represented' emotions; 'intellectual' versus 'emotional' acting; Stanislavsky versus Coquelin (or whoever else you choose). If we are mature enough, we can sidestep such abstract ideological squabbles. I have seen groups of actors break up over what appeared to be just such ideological differences. In spite of this, I believe that actors need not build such Towers of Babel on the strength of their ideologies. As with ideological differences in so many other fields, they have been used as rationalizations to cover some less respectable outcropping of hostile feelings such as occur when incompatible personalities clash or factions begin to form and jockey for control.

It would seem far more important that an actor be able to communicate with his fellow players, rather than worry about who is which kind of an '-ist.' Un-

fortunately, breakdowns in communication are all too frequent, as suggested by the long line of empty expressions listed above. For instance, an actor will be told to project; and this will often begin to do peculiar things to his stage behavior, although all that was meant was 'I can't hear you way back here.'

The main point to get across is this: to borrow Hayakawa's figure of speech, the actor should be able to ascend and descend the abstraction ladder with speed and nimbleness. Most actors are agile enough in scampering up the ladder, but very few of them ever go down far enough or often enough. The result of this is a lot of acting that is pretty much disembodied from any extensional foundation.

Thus Joseph Schildkraut went down the ladder and came up with a certain human insight into what it means to be a released prisoner; Lee J. Cobb, as Willy Loman in *Death of a Salesman,* found a certain insight about what it means to be a family man who can't accept himself. These portrayals were creative and forceful because their higher abstractions started from far below, from down deep in the processes of life. The attempts of a near-crippled prisoner to walk like a free man; the efforts of a dog-tired road salesman to gain control of his memory after driving his car off the shoulder of the road — these human processes are the extensional soil where the actor should plant his abstraction ladder in order to be able to scale the heights of creativeness.

BURTON SUCHOFF

Bronx, New York

The Opaque Projector in Composition Classes

SIRS: In his recent paper, 'Linguistic Science and the Teaching of Composition' (*ETC.* 7.97ff. Winter 1950), S. I. Hayakawa outlines a plan for a composition course informed throughout by present-day linguistics, one which seeks, by cross-criticism within the class, to develop in the students a consciousness of their native tongue and a skill in its use which traditional methods do not achieve. He asks us, in effect, to let the students teach themselves by developing standards of achievement sufficient to the occasion; and one of the means he recommends is the use of the opaque projector. I am afraid that the force of this suggestion will be lost among the other issues he raises, and I wish to emphasize the value of the projector in the development of language skills.

At Wayne University we have been using this machine in many of our composition sections to achieve a kind of publication within the classroom, so that each student can see what the others are doing and have his own work read and appraised by them. We are of course not the first to do so, and we do not operate under the best conditions, and perhaps we do not have the largest number of individual teachers working with the projector; but we have by this time

built up so large a body of experience with it that we can measure its value. I suppose that it is sufficient to say that most of us are annoyed when we cannot have it or are forced to curtail its use. We think that it increases the competence of our students in writing the English language.

I should say here that we test our entering freshmen and distribute them as well as we can in courses suited to their achievement. We excuse about five percent from Composition 1, and put about seventy-five percent into it. The remaining twenty percent we assign to a non-credit course called 1-R, from which they are not promoted until they satisfy us that they have a fair chance of success in the regular course. As we handle 1 and 1-R, their subject-matter is certainly the language, even if individual teachers may have had little training in linguistics. Composition 2 is a sort of idea course, emphasizing thought and argument, and assuming the basic competence we hope to achieve in 1. It is in 1 and 1-R that we have so far used the projector.

Most of us use it once a week, for we have found more frequent use — on our budget — too expensive, and less frequent use too inefficient. Unless the classes can get used to it and stay used to it, its value diminishes. We find also that the size of the class is important. A large class is unwieldy and diffuse, with some members too far from the screen to see clearly; a small class is tight, close-knit, clustered about the screen, and quick to respond. Less than twenty is best; twenty-five is almost too many, and thirty students out of the question. We have difficulty getting screens of the right size and shape; projecting a whole sheet of theme-paper, we need a large screen of about the same shape; often the only way we can get it is to paint it on a flat wall.

Our introduction of the opaque projector happened to coincide with another change we have been making in 1-R: we have been giving up 'remedial grammar' and 'review of basic fundamentals' in favor of writing, so that the course is becoming, on its own level, much more like Composition 1, where writing has always been emphasized. Whether traditional or descriptive, the grammar in the course is now pretty much tempered to the most obvious needs, many papers are written both in and out of class, and there are frequent conferences as private as can be managed in our crowded offices. We try for classes ranging in size from fifteen to twenty students; in Composition 1, we let them go to twenty-five. Two themes are written for the final examination; these are read by two persons other than the teacher of the section, and the basis for our judgment is our guess at the writer's probable success in the regular course.

Our method of using the projector is simple: we put a paper in and call for comments from the class. We probably fall short of Hayakawa's ideal in that we do not completely abdicate our positions of authority, but democracy in the classroom is not something to be lightly instituted, or, once in, to be managed without considerable natural affinity for it, and great skill. We draw

out the silent by putting the finger on them, and when the students have had their say, we do not hesitate to have ours. We manage to get through from three to five papers in one class hour, on the average. We find it best to ask somebody to read the paper aloud, so that we can be sure that slow readers and fast readers reach the end together.

The conditions under which we use the projector are certainly not the best. We have as yet no certain home for it, and so we must take the class to a strange room, which may be hot and dark, crowded, and filled with the slight hum of the fan which cools the projector. As amateurs, we frequently fumble in our operation of the machine; and we are sometimes relieved if some mechanical genius, butcher of the language though he may be, rises in contempt and pity and takes its operation out of our hands. Yet we feel, in the main, that the bother and trouble are worth while, because the opaque projector is the means by which we rupture the vacuum which surrounds the student, and let in the world. It gives him an audience, one which faces the same problems and stumbles over the same difficulties he does himself. For most of our students this is a new experience.

IT IS so new, in fact, that the first few sessions may seem fruitless. But this is a passing phase, long with some classes, shorter with others. Anyone using the machine for the first time must be prepared to persist with it until the class catches hold. Comments are at first banal. Most freshmen are formalists, sticklers for the most sterile correctness that the purists among them demand. They see errors in grammar and spelling and almost nothing else. They show, in fact, almost no critical ability in its true sense; they do not seem able to tell a good, effective piece of writing from a poor one — and we may well wonder how, in such a case, we can reasonably expect them to write a good one. Yet there is considerable going on in their minds, and they are often appalled at the sight of their own work writ large upon the screen. One of the main satisfactions we derive from the use of the projector lies in seeing the slow growth of that critical sense without which no one can be expected to write well.

Sessions with the projector have all the value of the private conference by which most of us teach most of what we actually do teach about writing, with the additional advantage that the comments on each work are made by, with, and in the presence of all the students. My experience with composition teachers trained in linguistic and semantics — perhaps I should say *or* semantics — has not so far led me to feel, as I have hoped it would, that the training in linguistics or semantics by itself brings about a startling improvement in the actual teaching of composition. My experience with the opaque projector, however, leads me to feel that the machine does exactly this. It seems to me that any teacher who is sensitive to language and willing to guide his class with a light hand through a discussion of specific problems exposed on the

screen, can bring most of his students to a competence in writing they cannot reach without it. It has a dynamic of its own.

Hayakawa suggests the opaque projector as a valuable adjunct to a course informed by the teachings of modern linguistic science. (The dittoing of papers, which he also recommends, has never given me any satisfaction; the projected theme, in contrast to the pallid reproduction, is vivid, actual, living.) I suppose that my own handling of language problems would be in general satisfactory to him; it is certainly not dogmatic or traditional. It works well with the machine. But I do not think that it is necessary to go whole-hog with him in his treatment in order to get full value from the projector; it can be of great help to any teacher seeking to give his students what they need most of all when they write — an audience and its response to their work.

DONALD J. LLOYD

Wayne University, Detroit, Michigan

Feedback to 'Feedback'

SIRS: I am afraid that I know considerably more about feedback than I do about general semantics. Under either heading I feel impelled to comment on Kenneth E. Bonnell's article, ' "Feedback" and "Hunting" as Human Behavior,' *ETC.* 7.210-212 (Spring, 1950).

Mr. Bonnell is not alone in extolling the universality of the feedback principle. During the past two years writers have attributed feedback to everything from plant growth to democratic government.[1] The growth of living organisms is a case in point. In many species it may be demonstrated that if growth be artificially interrupted, briefly and well within the growing period, upon cessation of the retarding influence the individual will grow at a greater-than-normal rate, as if to make up for lost time. It might be said that comparison between accumulated growth and some sort of master pattern reveals a deficiency that calls forth a faster growth rate. Lo, feedback!

Note that through the same sort of reasoning we can ascribe feedback to a body falling through a fluid. Whatever the initial velocity of the body, it will always adjust *toward* an ideal velocity determined by local characteristics of the fluid. It can be seen that feedback, in the abstract sense, is a quality of all process, hence all reality! (It should be noted that this conclusion does not bar uncontrolled or unstable processes; processes which proceed *away* from an ideal up to infinity or to a point of discontinuity where they again become stable. Such processes may be labeled examples of *positive* feedback while the stable processes represent *negative* feedback.)

[1] Henry W. Parker, 'Feedback,' *Proceedings of the Institute for Radio Engineering* 37 (1949); Norbert Wiener, *Cybernetics* (New York: Wiley, 1948) pp. 113-136.

Upon contemplating the sweep of this conclusion or of the individual conclusions reached by Mr. Bonnell and the others, any thoughtful person will sense that there is something wrong, and the semantically-oriented may be far ahead of me. It seems to me that these writers have conjured up an exceptionally adroit brand of word-magic. It seems, further, that other technologists have trod similar paths.

SINCE the days of Maxwell's dynamical theory scientists have been aware that electrical, mechanical, and acoustical systems follow similar laws. This discovery was a tremendous boon to progress in all three fields, enabling each, in turn, to ingest developments from the other fields. Some scientist might have decided that the area of overlap should have an impressive-sounding label with a Greek root; say Apergasiatrics. Fortunately this never happened and we continue to use the good extensional term 'dynamical analogies.'

By means of dynamical analogies we are enabled to abstract three systems that may be treated as one, thereby achieving the economy in manipulation of symbols that must be one of the goals of abstracting. But the discovery of such a sweeping economy was bound to arouse the enthusiasm of zealots. And so there were those who said, 'Any laws capable of such wide application must be Principles of Creation,' and so proceeded to try to apply those laws universally. Their success was spotty; some dynamical formulae are given in textbooks on economics, more in books on meteorology. In philosophy they were easily able to 'prove' the universality of dynamical law by carrying it to the rarified levels where nearly anything is universal. Less directly their influence is discernible in phrases such as 'the boom-and-bust cycle' and 'the pendulum of public opinion,' not to mention 'history repeats itself.' (In point of fact, much of this influence antedates Maxwell, but the earlier trends do seem to have been paced by the development of mechanics.)

Probably most general semanticists will concede the validity of laws of mechanical vibration when applied to oscillating electrical circuits. But they will frown at the proposition that the same laws necessarily control fluctuations of public opinion. It is obvious that somewhere along the line the analogy becomes strained. Somewhere, reverse-order abstracting sets in.

SO IT IS with this matter of feedback. To say that an artist painting a picture exhibits feedback is describing the territory so that it will match the map. It is probably no accident that this is just what Mr. Bonnell expects of the artist in his illustration. If the artist's image could include every detail of paint thickness, every brushmark, it would be a remarkable map, indeed. The resemblance to the matter of dynamics is more than superficial since the concept of feedback embraces dynamics except in one hypothetical special case, wherein hunting would be impossible, and useful output as well.

Up to a point, the feedback concept can be very useful; in the field of neurology, for instance, feedback concepts pass the test of predictability with an excellent grade. Which raises the question of where to draw the line. It is my opinion that we will have to draw it far short of, 'Our economic, industrial, and social institutions depend on feedback for survival. . . .' If the directors of those institutions read all this about feedback, they are apt, like the Scotchman who heard about free-wheeling for the first time, to rush right out to get some. They couldn't be expected to know that it is just a label that has been applied to what they have been doing right along.

The purpose of so using a label more properly applied to servomechanisms is, of course, to entail application of the principles learned from the latter to the administration of the institutions. In other words, it is *to use one map for two territories* (or for a great many territories, depending on the distance to which your zeal carries you). Then the vital questions are whether or not the territories are similar enough and are new maps dear enough to make this procedure worth while?

The words 'performance' and 'action' do not appear on the sort of feedback map that engineers use in dealing with servomechanisms. They appear only in a high-level abstraction of that map. Any map capable of quantitative or qualitative predictions of the roughest sort would contain terms and functions to relate them that would be difficult, indeed, to put into ordinal relation to any features of the kind of reality with which the social sciences deal. And insofar as you have to retreat to high levels of abstraction in order to find your correspondence, to that degree is your map of less practical value.

To sum up, it seems to me that Mr. Bonnell has produced little more than a pretty figure of speech of the sort, 'The human body is a wonderful machine, but you have to take care of it just as you do of your automobile,' 'A college is like a sausage machine — you put a great variety of ingredients in the hopper, turn a crank, and out comes a string of uniform products,' 'Put a nickel in a jukebox and out comes a tune; put a good dinner in Al, here, and out comes a speech,' etc. I can't believe that any confirmed general semanticist would allow this sort of a thing to confuse him.

WARNER CLEMENTS

Sherman Oaks, California

In anything at all, perfection is finally attained not when there is no longer anything to add, but when there is no longer anything to take away. ANTOINE DE SAINT-EXUPERY.

DATES AND INDEXES

THIS ISSUE of *ETC.* contains 96 pages. It is the largest issue we have ever printed. Vol. I, No. 1 (August 1943) had 64 pages, as did all other issues to the end of Vol. II. With Vol. III (Autumn 1945) we started to print 80-page issues, which have been maintained almost without exception until the present. We should long ago have increased the size of *ETC.* had it not been for the steady rise in costs of paper and printing, which has largely offset the advantages gained from our steady increase in circulation. The present 96-page issue has been made possible, to a large degree, by the economies effected by Jean Taylor and Evelyn Rochetto of our business office. Issues of this size can be continued if there is increased support of the Society from our members and readers.

FRA FRASEBEKAEMPELSE TIL KULTURFORNYELSE and HJAELP TIL AT VOKSE FRA IDEOLOGIERNE are the titles of two articles by Werner Albrecht appearing in the January and February 1951 issues of *Frit Danmark,* a magazine published in Copenhagen. Not being able to read Danish, we could at least look at the pictures. Korzybski's structural differential is shown in one issue; in the other Ogden and Richards' 'triangle of reference,' and George Taylor's six blind men and the elephant, from the ISGS information bulletin; also diagrams from Irving Lee's *Language Habits in Human Affairs.* Encouraged by these familiar landmarks of semantic literature, we examined the text to learn that 'Et landkort er IKKE det terraen . . . ordene er IKKE tingene Et kort siger ikke ALT om terraenet. . . .' Also we discovered that 'Ko_1 er ikke Ko_2, Ko_2 er ikke Ko_3. . . .' Readers acquainted with semantic literature, even if they are unable to read Danish, will be able to spot the source of this Socratic dialogue:

— Fru Lee, synes De, kvinder er bedre husmødre end før?
— Hvilke kvinder?
— Hvilke kvinder? Naah, kvinder i almindelighed.
— Jeg kender ikke "kvinder i almindelighed." Jeg kender kun bestemte kvinder. . . .

THERE IS PLENTY OF MATERIAL for the printing of larger issues of *ETC.* The Editors have on hand manuscript that has been accepted as long as a year ago, which has not yet been published for want of space. Important papers to be reprinted from foreign journals and other sources difficult of access have also been accumulating. We ought to plan for 128-page issues in the future.

THIS DEPARTMENT, formerly called 'News and Miscellany,' has long been the least satisfactory part of *ETC.* to the Editors, partly because members are *extremely* uncooperative about sending us news, partly because we mislay, in the months that pass between issues, the news items we get. With this issue, we begin a new method, which is to abandon method. . . .

DR. DOUGLAS GORDON CAMPBELL, DR. WILLIAM PEMBERTON, and MICHAEL J. WALSH, whose names are known to students of general semantics for early contributions to the literature, were scheduled to appear together on a program on nutrition at a meeting in April in Coronado, California, of the American Academy of Applied Nu-

trition. At this same meeting, J. A. C. Harding, D.D.S., was scheduled to give a paper on 'Semantic Compulsions and Foods.' Since Campbell, Pemberton, and Walsh (who should know better) have not sent to the Editors information about this program, we have no way of knowing if it ever took place. All we saw was a preliminary announcement which Dr. A. W. Pearson happened to have with him when he attended the ISGS Board meeting in March.

BUT THE INCREASED COST of an 128-page issue will be greater than the increase in the amount of paper and printing required. The present 96-page issue is as large as the magazine can become without a change in the method of binding. With larger issues, we shall have to change to a sewn binding (in place of the present wire-staple binding), which will increase the cost at least six cents a copy, or around $225 on our usual run of 3800 copies, over and above the increased costs of paper and printing. Another solution would be to have six issues annually instead of four. This too would put a greater financial burden on the Society than it can stand with its present membership. But it is obvious that the steady increase in scholarly production in general semantics literature will soon necessitate some kind of expansion of *ETC.*

AT THE CENTRAL STATES SPEECH ASSOCIATION meeting in Chicago, April 20 and 21, there was a special sectional meeting on general semantics at which papers were given by Thomas G. Miller of Northwestern ('Preliminary Investigations of the Construction of a Scale of Specificity'), Charles R. Elliott of Northwestern ('Some Applications of General Semantics in the Speech Clinic'), and Wendell Johnson ('Teaching a College Course in General Semantics'). Since none of them bothered to inform the Editors of *ETC.* of this very important event, we had to find out by extra-sensory perception.

PORTER E. SARGENT, well known for his *Handbook of Private Schools* (soon to be in its 33rd edition), and perhaps even better known for his witty annual survey of contemporary educational and intellectual currents, died March 27. Mr. Sargent left several uncompleted works in advanced manuscript stage which will be edited and published. Included among these are *Education for Continuous Warfare* (the third of a trilogy of which the first two were *War and Education* and *Between Two Wars*), *What's Wrong with Our Culture, What Education Might Be,* and *The Nature of Peace and War.* Inquiries about these forthcoming works may be addressed to F. Porter Sargent, 11 Beacon St., Boston, Mass. Porter E. Sargent was among the first to recognize the importance of general semantics in education. He was a Charter Member of ISGS.

THE CONFERENCE ON GENERAL SEMANTICS, co-sponsored by the University of Chicago and ISGS, will be just opening as this issue comes off the press. The Chicago Chapter and the officers of University College of the University of Chicago have been more than helpful to the Program and Local Arrangements Committees. Special thanks are due to Mr. Robert North, of the Chicago Chapter, and Mr. Edwin Diamond, of University College. While the Conference is an important event in the development of general semantics, it will be an even more important event in the history of *ETC.* This issue, which will be on sale at the Conference, is the *first* issue ever to come out on time. Heretofore our Autumn issues have come out in winter, our Winter issues in spring, and so on around the calendar. Our publication schedule has been a map with a lagging territory—sometimes lagging so far behind that people have wondered if we had suspended publication! But this issue, the Summer issue, is out on the first day of summer. We are dizzy with feelings of triumphant accomplishment. It feels so good we might try it again.

DR. JOHN J. KESSLER, lecturer in semantics at University College of Washington University, St. Louis, Mo. was recently given three awards for his activities in helping to break down racial segregation in the public schools of St. Louis. One award came from Omega Psi Phi fraternity, which cited him as 'the outstanding citizen of St. Louis for 1950.' The Urban League of St. Louis gave him an award for 'service in human relations,' and B'nai B'rith Men's and Women's Council cited him for 'the outstanding contribution to human relations in this area during 1950.' We should like to announce a fourth honor for Dr. Kessler: the *ETC.* Award for Keeping the Editors Fully and Adequately Informed of Chapter Activities. We always know what the St. Louis Chapter is up to, because he sends us the news regularly.

WHICH IS WHAT SEYMOUR NATHAN of the New York Society for General Semantics apparently intends to do from now on (we hope). NYSGS meets monthly at the New York Academy of Sciences, 2 E. 63rd St., New York. Mr. Nathan is secretary of the Chapter, and anybody wandering around in NY wondering what to do with himself can call him at Canal 6-0350 and find out if the Chapter is having a meeting, and when and where. At the May meeting, Dr. Jerome Alexander, editor of the authoritative five-volume *Colloid Chemistry*, spoke on 'General Semantics and Successive Levels of Structure.' Dr. Alexander was an early contributor to *ETC.* His paper on 'Successive Levels of Material Structure' appeared in Vol. I, No. 3 (Spring 1944).

THE CAMP FIRE GIRL, the monthly paper for leaders of Blue Birds and Camp Fire Girls, has an article in its April issue on the dangers of labeling and overreacting to labels: 'Are You a Pigeonholer?' by Gail Montgomery. We should be grateful to readers of *ETC.* for news of other articles in which formulations of general semantics are instructively used.

JOSEPH H. SPIGELMAN, in an article called 'Can Science Make Sense?' in the May issue of *Harper's*, hands to general semantics a very mixed bouquet of flowers: 'Clearly, what is needed is some calculus or model of differences and changes by reference to which differing and changing systems could be rigorously, yet simply, analyzed, ordered, and explained. This need has become evident to many people, and some have pretended already to have met it. The work in particular of the late Alfred Korzybski and his school of General Semanticists has commended itself to many as a satisfactory way of dealing with the fundamental facts of diversity and emergent novelty in nature. But this work has not won the acceptance of careful thinkers. While the General Semanticists deserve credit for recognizing the problem and wrestling with it, it seems doubtful that they have found the road to solution. Their specific contributions thus far — the "structural differential" and the rest — are only parodies of what is required.'

IMPORTANT AND SCHOLARLY RESULTS are to be expected, we believe, from Irving J. Lee's summer seminar in the Graduate School of Northwestern University, to be called 'Problems in General Semantics.' Among the guest-lecturers will be Thomas Fansler, of the National Safety Council; Elwood Murray, University of Denver; Francis P. Chisholm, Wisconsin State Teachers College; Russell Meyers, Iowa State University; Dr. A. A. Low, Chicago; Anatol Rapoport and S. I. Hayakawa, University of Chicago; Samuel Mermin, University of Oklahoma. Enrollment is limited to those working on advanced projects in general semantics teaching and research. Dr. Lee is also scheduled to give three lectures at the University of Missouri, June 18 and 19: 'The Semantic Point of View,' 'The Pursuit of Ignorance,' and 'Muddled Talk and Trouble.'

BEGINNING WITH VOLUME IX, there will be a change of editorial styling in *ETC.* The Editors of *ETC.* have joined with the editors of some fifty other journals in literature, the humanities, and the social sciences, in agreeing to uniform editorial practices in styling, documentation, footnoting, citations, etc. Some thirty more journals have agreed to these uniform practices in all but a few particulars. The Style Sheet of the Modern Language Association of America, compiled by William Riley Parker, gives complete instructions for the preparation of manuscript for *ETC.* and for all other journals which have joined in the agreement. The Editors have a supply of 'The MLA Style Sheet'; contributors may obtain a copy by sending 10 cents, plus 3 cents postage.

A 'LINGUISTIC BIBLIOGRAPHY FOR THE YEARS 1939-1947' has been published by the Permanent International Committee of Linguists, with a grant from UNESCO. This magnificent bibliography in two volumes, covering an incredible number of books and articles published in all parts of the world, lists items in general linguistics, phonetics, linguistic geography, onomastics; on the relations among families of languages; on the different language families; on problems in specific languages, including many exotic tongues we have never even heard of before. Inquiries about the volumes may be addressed to Editions Spectrum, Boite Postale 2073, Utrecht, Netherlands.

VOLUME II, NUMBER 4 (Summer 1945) of *ETC.* has long been out of print; there isn't even an extra file copy in the office. One of our members needs this issue so urgently that he has offered to contribute $25 to the Society in the name of the individual who is willing to part with his copy. The Editors will be happy to act as go-betweens in this beautiful transaction.

ANATOL RAPOPORT will give an intensive short seminar on general semantics at the New York Historical Society under the auspices of the New York Society for General Semantics, June 25 to 30. There will be seven sessions, one each evening Monday through Saturday, and one Saturday morning. On the opening evening he will give the lecture-recital, 'Music and the Process of Abstracting,' which he will have given the previous Friday evening at the University of Chicago Conference on General Semantics. The variety of interests and talents among ISGS members is indicated in the fact that Artie Shaw, the famous clarinetist and orchestra leader, will be chairman on the occasion of Rapoport's New York lecture-recital. Mr. Shaw became interested in general semantics through Wendell Johnson's *People in Quandaries.* Wendell Johnson got interested in Artie Shaw through Artie Shaw's *Sugar Foot Stomp* (Brunswick 7735) — or if that wasn't the record, it should have been.

THE SECOND ISSUE OF TRANS/FORMATION, edited by Harry Holtzman and Martin James, contains the second instalment of Allen Walker Read's useful study of the uses of the word 'semantics.' Rich in quotations illustrating the ways in which the word has been used, Mr. Read's study is indispensable to those curious about the intellectual genealogy of contemporary semantics and general semantics. A most interesting quotation is one in which a 'person with a talent for duplicity and double-dealing' is called a 'superb semanticist.' There are many indications, besides the quotations given by Read, that the word 'semantics' is being used in various quarters as a synonym for 'verbal trickery.' The study of semantics is becoming somewhat fashionable in many quarters; the result is that many people introduce the *term* into their writing and speaking to create the impression that they are intellectually *au courant,* without knowing what it means to semanticists. This creates an untidy linguistic situation, which a wider knowledge of

semantics and general semantics will no doubt eventually clear up. Meanwhile, however, the curious uses to which some people put the word 'semantics' ought to be collected as a lexicographical curiosity. The Editors will welcome clippings — with source and date clearly marked.

'THE SEMANTICS OF POLITICAL SCIENCE' is the title of an article by Charner Perry in *American Political Science Review*, 44.395-406 (June 1950). Mr. Perry writes, 'Any projected study of society which disregards the intricate ways in which behavior is structured by linguistic functions will surely be vain and empty. . . . Language not only orients men to each other but orients behavior to environment and orients men to values.'

THE SEVENTH ANNUAL LECTURE SERIES, presented by the Chicago Chapter of ISGS, was held again in Thorne Hall of Northwestern University (downtown). The speakers were Wendell Johnson ('The Intelligent Use of Intelligence'), Susanne Langer ('Symbols in Art and Music'), David Riesman ('How Different Can You Be?'), J. S. A. Bois ('General Semantics and Executive Training'), and S. I. Hayakawa ('Unexplored Paths in General Semantics'). Mr. Albert McKee, treasurer of the Chicago Chapter, arranged to have all these lectures recorded on long-playing records. What he plans to do with these records has not yet been revealed, but we suspect that he plans to rent them to other chapters of ISGS in order to raise money for *his* chapter.

AFTER THE DIANETICS review in the present issue was sent to the printers, Dr. Karl Menninger called our attention of an article. 'Through the Interstellar Looking Glass,' by Winthrop Sargeant in *Life*, May 21, 1951. The article is about science-fiction and its organized fandom. Apparently, Mr. Hubbard is far from being the only science-fiction addict to have confused imaginings with reality. There is, however, an organization of science-fiction readers who object strenuously to those authors and editors whom they accuse of 'debasing the ethics of science fiction in a shameless bid for circulation by presenting fiction in the guise of fact.' Sargeant reports, 'The grumbling [of science-fiction readers] rose to a loud roar last year when [Editor] Campbell's magazine [*Astounding Science Fiction*] became the first vehicle for the new psychological "science" of dianetics.' A cautiously-worded but approving article on dianetics by Professor Frederick L. Schuman called 'Peace of Mind through Dianetics?' appeared in the April 1951 issue of *Better Homes and Gardens*. Dianetics is dying, but is not yet dead.

MUCH IMPORTANT NEWS about our members never reaches the Editors of *ETC.* Some members write articles on general semantics for other journals, and never send us reprints. Others write books and fail to send us review copies, and are annoyed when their books are not reviewed. (Of course some members are annoyed when their books *are* reviewed.) Others go on European concert tours, travel on governmental missions, write novels and poems, become deans of schools of journalism, get elected to state legislatures, give art exhibits, initiate new courses in general semantics at colleges and universities, give speeches on general semantics before the United Daughters of the Confederacy, organize conferences on general semantics at regional teachers conventions, or apply general semantics in the training of police officers — and never report these events to *ETC.* We earnestly request members of ISGS to keep us informed. The generality of the methods of general semantics is demonstrated only by the variety of its particular applications. Information about the varied activities of our members and their many different applications of general semantics in their work is important to all our readers.

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Donald C. Lamons, M.D. '49, Flemmie Lancianese '50, Eli W. Lane, M.D. '49, Rose Lariviere '49, Russell H. Larson '49, Esther Lavin '50, Doris Lee '51, Sylvanus George Lee '45, Fritz Leiber '50, Robert D. Leonard '50, Leo A. Lerner (C), E. J. Lesch, Jr. '50, Dr. & Mrs. Maurice Lev '49, Samuel Levinson '48, Leslie L. Lewis, Jr. '47, B. W. Lichtenstein, M.D. '49, Theodore Longabaugh '45, Edward MacNeal '45, Howard Malik '50, Dr. Joanne Starr Malkus '51, Frank Marek '49, Mrs. James Mason '49, Daniel Massen (C), Helen G. McDonald '49, Malcolm L. McDougall '46, Robert L. McGrane '48, Thomas J. McHugh '48, Albert E. McKee '47, Mrs. Albert E. McKee '46, Dr. Raymond W. McNealy (C), August V. Meier '48, Rolland Metzger '49, Zerline M. Metzger (C), R. T. Mijanovich '45, Edyth B. Menser '46, N. Christian Meyer, M.D. '51, Roger H. Miller '51, Donald Monk '50, Lulu M. Moore '50, Ruth Moore '51, Mrs. A. M. Morgan '50, Esther B. Myers '50.

Ben Nagata '45, Jiei Nakama '49, Carl T. Nelson, Jr. '50, Oliver A. Nelson '50, John B. Nettles, M.D. '49, Wendell H. Ney '45, Margaret M. Nice '48, Willard G. Nolting '50, Robert North '50, Richard Nusinow '46, Edward T. Parker '50, Lt. Thaddeus S. Paskiewicz '46, Mark A. Peiser '47, Margaret Penney '48, A. H. Peron '47, Margedant Peters '46, Louis Polad '51, Lee Pravatiner '50, Joseph Price '48, Adele H. Pritam '51,

Carl J. Pudewill '51, Dr. & Mrs. Anatol Rapoport '45, Boris Rapoport '49, Mrs. Boris Rapoport '49, Theodore Reckling '48, Clay Remington '45, Byron Loomis Reynolds '49, Theodore F. Rich '51, Murray M. S. Richardson '47, Evelyn Rochetto '45, Dr. Carl R. Rogers '50, Carsten Royem '46, George L. Ryan, 49, J. J. Ryan '48.

Harold Sammann '51, Ruth J. Sandstrom '50, Bernice H. Schieler '50, Dr. & Mrs. George A. Schmidhofer '48, George W. Schmidt '45, Gretchen A. Schoenfeld '50, Robert J. Schubach '48, Albert Schwartz '48, Bunny Selig '50, Lillian Semmelmeyer '50, Madeline Semmelmeyer '50, Samuel B. Shapiro '46, John Shefke '50, David James Shipman '45, Mr. & Mrs. Henry Shucker '47, Bob Silberstorf '46, Abe Sklar '46, Miles Skrivanek, Jr. '48, Gladys F. Solomon '48, Liv Solvig '51, Richard E. Stafford '50, Samuel Stalnick '50, Mrs. E. M. Stannard '48, Prof. Julian Steen '45 ,Willis J. Steen '48, Richard Stevens '45, Edward R. Stone '49, Natalie Stone '50, Paul R. Stout '48, Richard A. Strehlow '45, Rosemarie Strueck '51, Ernest J. Sweeney '48, Dr. C. Harold Swenson '49.

Mrs. Saul D. Tannenbaum '45, Mr. & Mrs. George A. Taylor (C), Richard B. Terry '46, Helena S. Thompson '50, Loring M. Thompson '51, James G. Thomson '50, Gerhard E. Timmel '51, Mr. & Mrs. Norman Tolson, Jr. '48, E. Philip Trapp '49, Joseph L. Trocino '47, Charles B. Tuttle '50, Geraldine Udell '45, Sam C. Udell, M.D. '50, Harold C. Voris, M.D. '48, R. Lee Wagner '50, Marjorie J. Waldstein '51, Theo W. Wallschlaeger '48, Stephen Warren '51, John P. Watson '45, Dr. A. Louis Watten '48, Walter G. Wegner '50, Mr. & Mrs. Giles B. Weise (C), Gladys O. Wendel '48, Marie Weseman '49, Nelly Wicksell '51, Mrs. E. C. Williams '50, Roger E. Wolff '49, Lillian D. Wolfson '45, Ruth Wolgast '46, Harry Woodnorth '48, Mrs. J. A. Woolf '46, Samuel Woolf '50, Edith M. Worley '50, Mrs. Norman R. Wynne '45, Alice Bradford Young '45, Louis M. Zorich '47.

Chicago Heights: Mrs. Paul W. Keegan '46. *Cicero:* Gloria Klouzar '50, Shirley Sawyer '50. *Crete:* Mr. & Mrs. Gordon Abbey '45. *Crossville:* Walter W. Aylsworth '45. *Crystal Lake:* Mrs. Dale Allan '49. *Decatur:* Genevieve J. Drennen '50. *Deerfield:* Edwin S. Hewitt (C), Harold G. McMullen '50, Richard J. Roth '51, John Winter '51. *Des Plaines:* Victor Rubin '45. *Dixon:* Elwood Cook '49, A. H. Nichols '49. *Dolton:* Elizabeth Harms '49, Maleta Pohlers '46. *Elmhurst:* Frank Interlandi '49.

Evanston: Dr. Alfred C. Ames '45, Clara Belle Baker (C), Sanford Berman '48, Joyce Block '48, Charles R. Elliott '48, Corinne Chisholm Frost '45, Karl Hauch (C), Dr. Irving J. Lee (C), Dr. Abraham A. Low '48, Martin Maloney '45, Mr. & Mrs. Everett McNear '48, Slater E. Newman '51, John Edward Ortmeyer '45, Mrs. D. J. Peacher '50, James Poe '51, Penelope Pearl Pollaczek '48, Mrs. T. E. Quisenberry '48, W. L. Stickney, Jr. '47, Dr. Randall L. Wescott '45, Mr. & Mrs. R. A. Wickland '45, Mrs. Norman C. Wittkopf '49, Prof. Paul A. Witty '45, J. R. Zweizig '48.

Evergreen Park: Robert Owen '50. *Flossmoor:* Agnes B. Lilley '48. *Freeport:* David M. Burrell (C), Virginia Calkins '49, Richard J. Credicott '48, M. F. Goodheart '50. *Glen Ellyn:* Kenneth R. Burley '48, Leo A. Lotz '50. *Glencoe:* H. H. Chandler '48, Wilfred V. Jones '49, Kimball Nedved '49, Mr. & Mrs. K. V. Reed '45, Ben W. Schenker '45. *Granite City:* Eva L. Meier '49. *Great Lakes:* Captain H. W. Goodall '51. *Harvey:* Tom Powers '47. *Highland Park:* Mrs. Albert L. Arenberg '49, Lester K. Fleischmann '45. *Hinsdale:* Charles B. Congdon, M.D. (C), Mrs. Robert B. MacMakin '50, Prof. L. A. Turner '47, Mrs. L. H. Whitehead '51. *Hollywood:* George A. Karl '45. *Jacksonville:* Charles D. Atherton, Jr. '49.

Joliet: Brady P. Maddox (C). *Kenilworth:* Charles R. Simmons '50. *Lake Forest:* Parke G. Burgess '50, Paul Host '49, George Amos Poole IV '49, Mary B. Sturtevant (C), Dr. Roy E. Sturtevant (C). *La Grange:* Howard Shelton '45. *Lake Zurich:* Dr. John Gruen '44. *Lombard:* Mr. & Mrs. Edgar C. Farren '45. *Lyons:* Vlasta L. Jurco '50,

Macomb: Mrs. Marcy Bodine '48. *Marshall:* L. F. Schmidt '49. *Maywood:* Gerald P. Paternoster '50, Ralph L. Smith (C). *Northfield:* Mrs. G. E. Siebel '45. *Oaklawn:* Earl W. Hoyt '50. *Oak Park:* Helen Barclay '50, Melvin F. Blaurock, M.D. '48, Joseph Gruse '50, Dr. Rudolph Hinrichs '51, George Vician '45. *Park Ridge:* Dr. Marion Lee Gordon '48. *Peoria:* Dr. Walter H. Baer (C), D. J. Crowley '45, Larry Norton '50. *Quincy:* Arlene Oberhelman '45.

Riverside: William Cregar '48, R. E. Dooley '50. *River Forest:* Alice F. Gibson Brickley '48, Robert E. Cantwell III '50, Mrs. Arthur F. Joslyn '45. *River Grove:* Edith M. Godar '50. *Rockford:* Chester W. Anderson '49, Charles F. Ayres '51, Mrs. Wayne Bissell '50, Mrs. Lyle B. Coon '49, Leo F. de Sola '51, Dr. A. Howard Erickson '48, James Russell Leary '51, Mrs. William A. Sills '49, Richard Sorenson '51, Bertha J. Vincent '45. *Springfield:* Jeanette Frasier '45. *Urbana:* Lee S. Hultzén '50, Dr. Andrew M. Linz '49, Dr. George D. Stoddard '48, Prof. Hugh Gregory Wales '50, Stephen E. Walkley '45, D. W. Whitman '50. *Waukegan:* Walter F. Brunet '50. *Wilmette:* Melvyn D. Jones '50, Doris L. Mayo '50. *Winnetka:* Robert H. Carpenter (C), Richard Douglass Cooper '49, Mrs. Budd Gore '50, Olga Leap '46, Francis R. Stanton '49, W. H. Trout, '47. *Woodstock:* G. R. Austin, Jr. '50.

INDIANA. *Cedar Lake:* Sherwood A. Wakeman '49. *Crown Point:* Earle E. Langeland '45. *East Chicago:* Howard C. Richards '51. *Elkhart:* Ralph W. Lane '50. *Evansville:* Carolyn Hocker '49. *Fort Wayne:* Mr. & Mrs. O. Harold Kibiger '49. *Gary:* Mr. & Mrs. Thorton Hooper '51, Sonia Leskow '47, Lester Roseborough '51, Donald M. Schwartz '48. *Hammond:* Vera Eastwood (C). *Indianapolis:* Dr. John H. Greist '48, Wendell D. Little '48, Philip B. Reed, M.D. '48, Helen M. Sommers '50. *Plainfield:* Mrs. Charles Hughes, Jr. '50. *Terre Haute:* Gordon K. Haist (C). *Whiting:* Mrs. Charles E. Jordan '50, John J. Kubacki, Jr. '49.

IOWA. *Cedar Falls:* George B. Rosenberger '49, Sam T. Stahl '47. *Cedar Rapids:* Zereda B. Van Deusen '49. *Cherokee:* Dr. Estelle A. Wise (C). *Clinton:* Doris E. Colbornson '50. *Davenport:* W. K. Henigbaum '47, Dr. John I. Marker '48. *Des Moines:* Dr. Walter D. Abbott '48, Donald R. Murphy '45, Marjorie E. Thornton '50. *Farnhamville:* Mrs. Robert A. Williams '50. *Galva:* Chester C. Challman '48. *Gilmore City:* Leah Mae Nefzger '49.

Iowa City: R. C. Bedford '50, Jesse O. Berry '51, Raymond G. Bunge, M.D. '49, Lucy Ann Collins '51, Dr. Stuart C. Cullen '48, Jason A. Ellis '47, R. H. Flocks, M.D. '50, Clair Hanley '50, Dr. Wendell Johnson (C), Robert A. Kramer '51, George J. Kriehn '49, E. C. Mabie '50, Prof. Leslie G. Moeller '48, Alan E. Schoenhaus '51, Hugh F. Seabury '50, Howard Swaine '50, Dr. D. C. Spriestersbach '49, Mrs. D. C. Spriestersbach '45, Dr. Robert T. Tidrick '49, William R. Tiffany '50, David Williams '45. *Keokuk:* Ray Buchan '48. *Oxford:* Russell Meyers, M.D. '45, Mrs. Russell Meyers '45. *Sioux City:* Fred T. Kelly '49. *Sioux Rapids:* Rev. Noel P. Orcutt '48. *Waterloo:* Dr. George B. Groves '49, Mrs. L. J. Weber '48.

KANSAS. *Augusta:* Mrs. C. F. Parker '51. *Coffeyville:* Sam Klapper '47. *Independence:* Paul Gillis '49, Dr. James G. Hughbanks '45, Bernard Locke '45, Ralph Pearson '49, A. Phillip Persky '45, Robert Sayers '45. *Kansas City:* Mildred A. Williams '51. *Langdon:* Richard C. Houts '48. *Lawrence:* Myrta J. Anderson '49, Russell Annis '49, James Duffy '50, Charles Hyer '49, Lee Meyerson '45, Prof. W. D. Paden '49, Prof. Edward Schouten Robinson '48. *Mission:* Rowland D. Sager '49. *Overland Park:* Marvin G. Pettit '50. *Scott City:* Ansel Drake '50. *Topeka:* Walter Kass '49, Dr. Leonard P. Ristine '48. *Wichita:* Dr. David T. Herman '48, Dr. Salvatore Russo '49.

LOUISIANA. *Abbeville:* Mrs. Bertil Carlson '50. *Baton Rouge:* Betty Jean Caraway '50, A. Bruce Gaarder '47, Samuel P. Geralds '50, Tom Gillen, Jr. '49, Prof. C. M. Wise '49.

Lake Charles: Dr. G. C. McKinney (C). *Morgan City:* Joseph Mickel '48. *Natchitoches:* Mary M. McEniry '49. *New Orleans:* Louise S. Davis '49, Thomas T. Gillen, Sr., '49, Dr. Lou LaBrant '45, Dr. Cecil W. Mann '45. *Ruston:* Wesley M. Cretney '49.

MAINE. *Lewiston:* Comdr. W. S. Libbey '45. *Rockland:* Norman F. Stanley '48. *Waterville:* Prof. E. J. Colgan '45.

MARYLAND. *Baltimore:* Carl Christ '45, Jacob E. Finesinger, M.D. '48, Al Soroka '48. *Cambridge:* C. L. Lynn, M.D. '50. *Chestertown:* Robert D. Gordon '50. *Chevy Chase:* Rear Admiral J. C. Metzel '49, Dr. Henry Lee Smith, Jr. '51, Frederick H. Untiedt '48. *College Park:* Robert A. Bays '45. *Frederick:* Mrs. Arthur J. Rawson '46. *Gaithersburg:* Capt. & Mrs. J. A. Saunders '45. *Glen Burnie:* Wallace E. Kendall '46. *Olney:* M. Russell Leedy '48. *Silver Spring:* Walter W. Deshler '49, Dr. Frank L. Verwiebe (C).

MASSACHUSETTS. *Amherst:* Prof. Doric Alviani '51, Mrs. Percy T. Johnson '50. *Andover:* Addison Gallery of American Art '48. *Arlington:* John B. Fox '45. *Attleboro:* William G. Elliott '48. *Boston:* Editor, Beacon Press '45, Prof. Joseph G. Brin (C), Joseph Capostagno '50, Dr. Walter H. Commons '44, Raymond Gelinas '49, Charles N. Leef '50, Richard S. Shuman '45, James E. Stuart '49, Helen H. Tedford '47, B. Gay Waterman '45, Glenn Wilson '51. *Brookline:* Lila Kastick '48, Mrs. H. F. Pritzker '48, Francis S. Wyner '47. *Cambridge:* D. D. Bourland, Jr. '46, Dr. Philipp Frank '46, William F. Heijn '48, Dr. Clyde Kluckhohn '46, Rollin P. Mayer '50, John O. McCormick '51, James O. McDonough '48, Donald N. Michael '47, Lloyd & Mary Morain (C), Sherman Paul '48, Prof. Alfred D. Sheffield '45, Andreas James Yiannias '50. *Canton:* Benjamin F. Greene, Jr. '48. *Charlestown:* Charles A. Shackford '48. *Chelmsford:* Eleanor Parkhurst '44. *Chestnut Hill:* Dr. G. C. Flick '44. *Dover:* James B. Pond '49. *Everett:* Lester H. Hulsman '51. *Framingham:* Dr. Angela Folsom Quadfasel '48. *Leverett:* Norman E. Wilson '50. *Lexington:* Stillman P. Williams '45. *Longmeadow:* Gilbert Cohen '50, S. A. Simon '49. *Mansfield:* Dorothy K. Howerton '47. *Melrose:* Dr. Frederick A. Trevor (C). *Milton:* Charles R. Morris '49. *New Bedford:* Abram Freedman '47. *Newton:* Frances H. R. Dewing (C). *Newton Centre:* Dr. Stewart W. Holmes (C). *Northampton:* Mrs. Clifford Lippincott '50. *Somerville:* James R. Leiby '48, Thomas J. Vaughan '49. *South Boston:* Max Margolin '45.

Springfield: Mable R. Beman '49, Mrs. Leonard M. Brown '50, Margery L. Grout '50, Virena S. Jones '49, Graham S. McCloy '48, John M. Nash '50, Mrs. Harold M. Tallman '48, Daniel R. Wheeler, M.D. '46, Gordon J. Williamson '49, Mrs. John Willis '50. Dr. Kenneth Winetrout '50. *Squantum:* Merrill Moore, M.D. '48. *Taunton:* Rev. Robert Lee Dutton '45. *Tyringham:* Agnes B. Curtin '50. *Waltham:* Dr. Stuart A. Mayper '47. *Ware:* F. Joslin '47, Stanley London '51. *Wellesley:* Prof. Edna Heidbreder '49. *Westover:* Sgt. Thomas M. Cochran '49. *West Springfield:* Arnold S. Evans '50. *Woods Hole:* Dorothy B. Eldredge '51. *Worcester:* Randall W. Hoffman '49, Dr. Heinz Werner '45.

MICHIGAN. *Ann Arbor:* Kenneth E. Boulding '50, George Charatis '50, Ruth Curtis '46, Al Eglash '50, Sarah E. Grollman (C), Dr. C. L. Meader '46, N. Edd Miller '48, Stephen B. Withey '48. *Charlevoix:* Mrs. Earl E. Broussard '45, Robert C. Smith '45. *Chesaning:* Dr. James E. McAlpine '50. *Dearborn:* John E. Gallagher '46, Edmund Golebriowski '49, E. A. Herider '48, Dr. & Mrs. Henry LeMaire '49.

Detroit: Dr. C. G. Browne '51, Leavitt J. Bulkley '51, Jennie Cash '48, Etta J. Catlin '51, Howard Chynoweth '47, Albert Cohen '48, Harold R. Cole '49, John Controulis '49, Norman Douglass '48, James E. Elliott '50, Henry Elsner, Jr. '48, G. Leslie Field '47, Bill Gail '51, Bruce M. Gildersleeve '50, James L. Grisell '51, Allan Grossman '48, Olive Grunow '47, Fred W. Halstead '48, H. Heidenreich '45, Mark Howard '50, Leonard Kasle '49, Ernest G. Kellett '48, James G. Kellett '48.

Dr. Earl C. Kelley '49, John Kemsuzian '48, Robin Samuel Key '48, Babette Kopple '49, Marie Krynicki '50, Bayre Levin '50, Theodore Litwin '49, Arnold Marvin, Jr. '48, Mrs. Austin G. Melcher '49, Makio Murayama '45, John J. Musial '49, Donald O'Brien '50, Joseph Petrison '47, Clara Pietrasz '47, Ellis J. Potter '48, Dr. Karl Pottharst '45, Dr. Fritz Redl '48, Hugh V. Ross '45, Dr. Louis A. Schwartz '48, John T. Simons '48, Harry Slavin '49, Albert Staats '50, Peter Ternes '46, Dorothy G. Turkel '49, Myrtle Van Buskirk '48, James R. Wilson '48, Mrs. Henry Wojno '51. *East Grand Rapids:* Dr. Carl F. List '48. *East Lansing:* C. Merton Babcock '51, Lois Elaine Banzet '50, John N. Moore '51. *Farmington:* Raymond V. Bodinus '47.

Flint: Clara G. Hanson '46. *Grand Rapids:* Lois N. Kollenberg '48. *Grosse Pointe:* William D. Hammond '46. *Grosse Pointe Park:* Alma Ruppenthal '48. *Grosse Pointe Woods:* Alfred P. Galli '49. *Harbor Springs:* Sheldon D. Smith '47. *Hazel Park:* Joseph Mitchell '50. *Iron River:* L. P. Fisher '50. *Jackson:* Walter J. Ducey '48, Prof. Wilferd P. Raynor (C). *Marquette:* Harry J. Entrican '51. *Mt. Pleasant:* Helena I. T. Bailie '48. *Olivet:* James E. Camp '51. *Royal Oak:* O. S. Reimold II '49. *Sault Ste. Marie:* Josep Vidal-Llecha '49. *St. Clair Shores:* Walter G. Hayes '50. *Van Dyke:* Dr. Oscar C. Ross '48. *Ypsilanti:* C. Wallace Dalley, M.D. '50, Mrs. W. O. Davis '51, Lucile Hair '50.

MINNESOTA. *Duluth:* Lewis R. Peyton '47. *Mankato:* Mr. and Mrs. R. W. Bruner '50. *Minneapolis:* Paul M. Boutebiba '50, Spencer F. Brown, M.D. (C), Glenn Gullickson '48, Dr. Ernest H. Henrickson '45, Lee Loevinger '48, Paul H. Ptacek '46, E. M. Schey '48, Dr. Hildred Schuell '45, Dr. A. B. Thomes '46. *Oak Terrace:* James T. Collins '45. *Preston:* Mrs. G. Patrick Warner '48. *St. Paul:* Thomas P. Beyer '49, Dr. Edward P. Burch '50, Dr. Gordon R. Kamman '48, E. D. Klemke '47, Prof. Paul M. Laporte '49, Judge Gustavus Loevinger '50, Harrison E. Norton '48, Dr. Victor H. Storberg '48, Chester C. Waters '45, Hardy Wright '49.

MISSOURI. *Chesterfield:* Ray Alsbury '51, Thelma W. Thalinger '49. *Clayton:* John Keith Inman '48, Dr. & Mrs. Walter L. Moore '50. *Columbia:* Prof. Earl English '45, Ervin D. Little, Jr. '50. *Concordia:* Allen Nauss '49. *Fort Leonard Wood:* Norbert Sajdera '49, Joyce H. Taylor '50. *Fulton:* Gladys L. Ewbank '48, Bernard P. Taylor '45. *Independence:* Maxwell A. Constance '51, Jeanne F. Dodds '50.

Kansas City: Margaret E. Adams '50, Jack W. Brooks '49, Bernard H. Brown '50, Prof. & Mrs. Wallace C. Brown '48, Marie Burrus '48, Prof. Alexander P. Cappon '48, Charles S. Clark '46, Ben G. Eisenman '51, Jack Fingersh '50, Margaret Gausewitz '48, William M. Guerin '48, Felix Kimball Hughes '49, Raymond L. LaMar '49, Violet M. Larson '51, Jean Martin '45, Bernard F. McCarty '49, James W. Powell '49, Robert L. Read '44, Dr. G. Wilse Robinson, Jr. '48, Harry M. Runyan '50, John L. Shouse, Jr. '45, Mrs. A. R. Silberberg '51, Mildred N. Smith '50, Wilburn D. Smith '51, Raymond Starr '48, Donald H. Tranin '50, William Weifenbach '51, Mildred A. Williams '51. *Kirkwood:* Mrs. G. C. Davies '49. *Liberty:* Rex Schaeffer '50. *Morley:* Beatrice McMullin '49. *Overland:* Grover Houser '46. *Parkville:* Elsa Grueneberg '45.

St. Louis: Mrs. Fred Armstrong '50, Ernest Boyd '46, Ann Madsen Dailey '48, Alfred Fleishman '49, Dorothy Gebhart '46, Leo S. Guccione '48, John S. Harris '49, Eileen Hastings '51, L. A. Hoynck '45, Ruth E. Johnson '50, Mrs. I. N. Kessler '49, Dr. John J. Kessler '45, Dr. Roland M. Klemme '48, Marie E. Kruse '46, J. R. Oxenhandler '46, Otto Pauls '48, Cecelia Seigel '51, Eugene E. Seubert '46, Morris A. Shenker '50, Mrs. Gilbert Spieldoch '46, Lawrence A. Still '50, Louis L. Tureen, M. D. '48, C. J. Wright '49. *Sullivan:* Carl M. Harman '48. *University City:* Lt. Allen Y. Davis '48, Morris Pearlmutter '49, Mrs. R. R. Smith '51. *Washington:* R. Gregory '51.

MONTANA. *Billings:* Robert H. Lyon '49. *Livingston:* Arthur P. Currier '49, Chan Libbey '48.

NEBRASKA. *Ainsworth:* Donald B. Thompson '48. *Hebron:* Edna M. Mitchell '49. *Lincoln:* Lucile Cypreansen '48, Thomas D. Houchin '46, Theodore Jorgensen, Jr. '45. *Omaha:* Dr. Harold Gifford '50, H. C. Struck '49.

NEVADA. *Caliente:* Marcella Merl '49.

NEW HAMPSHIRE. *Manchester:* Oscar B. Rogers '48.

NEW JERSEY. *Atlantic City:* Aaron Goldblum '50, Joseph A. Linsk, M.D. '49. *Bergenfield:* Dr. Charles G. Sage '50. *Dover:* Joseph C. Kennedy '48, Dr. T. A. Newlin '48. *Erskine Lake:* Paul Draper '49. *Maplewood:* Prof. Richard E. Henry '45. *Mays Landing:* Robert N. Yetter '47. *Milford:* Louis Adamic '45.

Newark: Leonard S. Amada '45, Marjorie Wescott Barrows '49, Irving Drill '49, Irving Elan '48, Alan Handler '50, Dr. Henry H. Kessler '45, Samuel Zitter '47. *Pleasantville:* Robert William Hahnlen '49. *Princeton:* Geoffrey W. Esty, M.D. '49, Erich Kahler '45, Douglas E. Wade '48. *Ridgefield:* Vivian Klemme Sawyer (C). *River Edge:* Mr. & Mrs. Karl W. Hinkle '45. *Rutherford:* Thomas S. Gardner '48. *South Orange:* Robert V. Redpath, Jr. '48. *Trenton:* Frederick M. Lister '49. *Verona:* Elsie Junghans '47. *Westfield:* Frank A. Epps '45.

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